

Teachers' Handbook on Content and Methodology of Teaching Science at Elementary Level

**(A REPORT ON THE ORIENTATION COURSE FOR THE
TEACHER EDUCATORS AND KEY PERSONS IN CONTENT
AND METHODOLOGY OF SCIENCE TEACHING AT
ELEMENTARY LEVEL)**

Venue :

**EXTENSION SERVICES DEPARTMENT
Regional College of Education, Bhubaneswar
From 9-12 December, 1999**

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PREFACE

The Orientation course for the teacher educators and key persons in content and methodology of science teaching at Elementary level was organised under the auspices of the department of Education and Extension Services department of this college from December, 9 to December, 14, 1991.

This orientation programme is a step to help the elementary teachers to some extent by throwing some light in order to find their own solutions of genuine problems faced by them in their day to-day teaching learning situation.

The programme was directed by Dr.S.C.Panda, Senior Lecturer in Education, who has tried to achieve the objectives of the programme and has brought out this handbook based on the syllabus of class V followed in the State of Orissa by the help of resource persons and the participants. They deserve appreciation.

I hope this handbook will be used by Teacher Educators, and Elementary School Teachers to their vantage. Any suggestion is welcome for improving the materials.



Regional College of
Education, Bhubaneswar.

Prof.K.C.Panda,
Principal

Date:- 30.3.1992

REGIONAL COLLEGE OF EDUCATION:BHUBANESWAR

ORIENTATION OF TEACHER EDUCATORS IN CONTENT AND METHODOLOGY OF SCIENCE
TEACHING AT ELEMENTARY LEVEL FROM 9.12.91 TO 14.12.91

TIME TABLE

Date and day	Forenoon Session 10.00 - 11.00	11.00 - 12.00	12.00 - 1.00	1.00 - 2.00	2.00 - 3.00	Afternoon Session 3.00 - 4.00	4.00 - 5.00
9.12.91 Monday	Registration	Inauguration	Programme highlights (SCP)	Lunch	Concept & Concept teaching & Learning- An over view (SCP)	Discussion on formulation of behavioural objectives and objective based evaluation. (ADT)	
10.12.91 Tuesday	Teaching of Sc. at Ele.level - A new look approach (JKM)	Minimum Level of Role of Ele. Learning in Sc. Teaching in Ele. school (GSH)	Programme highlights (SCP)	-do-	Standardisation of the technical terms adopted in school sc. Edn.(S.T)	Preparation of Low-cost Teaching Aids (S.P. & P.P.)	
11.12.91 Wednesday	Group formation & group discussion	Group at work	Group at work	-do-	Group at work	Group at work	Group at work
12.12.91 Thursday	Stock taking & Review	-do-	-do-	-do-	-do-	-do-	-do-
13.12.91 Friday	-do-	-do-	-do-	-do-	Stock taking & review. Validictory and Disbursement of TA/DA etc.	Visit to Planetarium	Visit to Science Museum
14.12.91 Saturday	Discussion and finalisation of final draft						

Resource Person(s) will be present to guide the group work.

External Resource Person*

- P.P. - P.Purohit, Dept. of Edn.
- SCP - S.C.Panda, Dept. of Edn.
- ADT - A.D.Tewari, Dept. of Edn.
- SPM - S.P.Mishra, Dept. of Edn.
- GSH - G.S.Hati, Dept. of Edn.

SPA - S.P.Anand

- HT - H.Tripathy, Dept. of Chem.
- * PKM - P.K.Mishra, Dept. of Phy.
- BKP - B.K.Parida, -do-
- JKM - J.K.Mohapatra, -do-


(S.C. Panda)
Programme Director

ACKNOWLEDGEMENTS

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The Orientation of Teacher Educators and Key persons in Content and Methodology of Science Teaching at Elementary Level was organised from December, 9 to December, 14, 1991.

Forty one participants from the State of Orissa and eleven Resource Persons (both internal and external) participated in the programme.

The Programme Director was assisted by Dr. S. P. Anand, Sri G. S. Hati, Sri S. P. Mishra, Dr. P. Purohit, Dr. A. D. Tiwari, Dr. H. Tripathy, Dr. J. K. Mohapatra, Dr. B. K. Parida, Dr. U. K. Nanda all internal resource persons and Sri P. K. Mishra, Lecturer in Physics, B. J. B. College, Bhubaneswar, and Miss S. Tripathy, Lecturer, Deptt. of Linguistics, Berhampur University, Berhampur. Their contribution in the Orientation Courses were commendable and we record our thankfulness to them all.

The Orientation Programme was inaugurated on December, 9, 1991 by Prof. (Dr.) S. T. V. G. Acharyulu, Dean of instruction and Head, Department of Education, Regional College of Education, Bhubaneswar. The Validictory function was organised on December, 14, 1991 and Dr. (Mrs.) S. Bhattacharya, Deptt. of Science, R. C. E., Bhubaneswar was the Chief Guest and Dr. S. P. Anand, Reader, Department of Education, R. C. E., Bhubaneswar was the guest of honour.

The Programme Director wants to put it in record the dedication, devotion, and determination with which the participants and resource persons organised themselves in bringing out this report in the form of a Hand Book.

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REGIONAL COLLEGE OF EDUCATION: BHUBANESWAR

HIGHLIGHTS ABOUT THE PROGRAMME ON ORIENTATION OF
TEACHER-EDUCATORS IN CONTENT AND METHODOLOGY OF
SCIENCE TEACHING AT ELEMENTARY LEVEL.

The teacher was in the past, is in the system at present and will be there in future also. There can be no substitute to a teacher at any time ever, in the field of teaching-learning process despite of modern development in the field of science and technology and the electronic media. It is an established fact that the teacher himself will act as an institution so long as the human race exists. A teacher is not always born teacher rather is made an effective teacher. The sincerity of purpose, zeal, interests in education process, discipline and other like qualities makes the teacher efficient. To be an effective teacher he is to face innumerable, unique and new problems in various situations in his day-today teaching-learning situation inside and outside the classroom. The multidimensional facts of these problems are experienced and realised by him and corrective measures are conceived and put to practice by him in these situations but for his teacher like qualities and commonsense.

To deal with preoperational and concrete operational learners at the elementary stage of our education system the teacher has to take up concrete steps and to do so, many a times he feels helpless as he sees in front of him a hazy picture of the actions that ought to be taken. He feels the urgent needs of some practical guidelines to deal with certain specific problems related to teaching-learning situation so as to overcome the problematic situation. To make the learner efficient he has to know, realise and do the activities necessary so as to strengthen the learners in body, mind and spirit.

The quality of learning depends upon the quality of the teacher and teaching. Hence the teacher has to plan his process of teaching most prudently and systematically. The National Policy on Education, 1986(NPE), has clearly stated that in the majority of the classrooms the mode of curriculum transaction does not cater to other development of different abilities and skills in a balanced manner of the learner. The style of teaching most prevalent is

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transmissive or expository, which puts a premium on memorisation rather than independent thinking. It places the teacher at the transmitting end, and the students at the receiving end, and so the delivery system is devoid of proper interaction between the teacher and the taught.

The National Curriculum Framework has visualised a change in the teacher's role from that of a mere transmitter of information to that of a facilitator of learning. The teacher has a multifacet role with regard to the sequential steps of instruction for effective teaching and learning which includes formulation of the instructional objectives clearly so that specific behavioural objectives with reference to knowledge, understanding, application, skill and attitude can be attained with the appropriate selected content matter provided in the textbook. Selection of appropriate teaching strategies and that too with befitting teaching aids involving variety of activities on the part of the teachers and the learners i.e. observation, collection of materials, experimentation, demonstration, group activities, discussion, inductive-deductive teaching, problem solving etc. so that the transaction of curriculum will be learner-centred. The NPE (1986) has also recommended that teacher should encourage learner-centred and activity based process of learning keeping in view of the learner's needs, interests, attitudes and abilities and aspirations. Since evaluation serves as a quality control in teaching-learning process and the present system of assessment does not cater to the exact need of the evaluation system it should be the endeavour of the classroom teacher to go deep into the matter and evolve an evaluation programme which should be continuous, comprehensive, cooperative, dynamic and diagnostic in different aspects of education.

A sincere effort should be made to meet the aspects mentioned above with regard to the teaching-learning situation derived from the content matters specified in the science textbook prescribed for Class V

by the Government of Orissa. The major content areas provided in the textbook are: The earth and the sky, Air, water and weather; Earth crust and the natural resources; Force, work and power, Matter and its nature; Animal kingdom and Humanbody-Food and health.

Keeping in view these aspects, the present programme has been designed with the following objectives to prepare a HANDBOOK for teachers to provided them some guidelines so as to help them reduce problems arising out of the day-today teaching-learning situation.


Thus the objectives are:-

- 1) Formulation of behavioural objectives with regard to the content matters in science prescribed for class V.
- 2) Identification of areas from the content matters for self-study, guided study, demonstration and experimentation etc.
- 3) Dealing with the language part of the content matters for deriving Oriya terminologies from english terminologies.
- 4) Preparation of low-cost teaching aids related to the contents.
- 5) Developing comprehensive and continuous evaluation tools to achieve the formulated behavioural objectives based on the level of knowledge, comprehension, application, attitude and skill of the students.

In fine, it is contemplated to have the following activities by the groups to be formed in the workshop. The groups were ^{involved in} the following activities:

- i) Model lesson Plan-one in each and
- ii) procedure of preparation of low-cost teaching aids connected to each topic.
- iii) suggested activities related to each topic (curricular, co-curricular & extra-curricular).
- iv) objective based evaluation tools having none emphasis on objective types.

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(Dr.S.C. Panda)
Programme Director

CONCEPT AND CONCEPT TEACHING AND LEARNING
AN OVERVIEW

Dr.S.C.Panda,
Lecturer,
RCE,Bhubaneswar.

What is a Concept:

A concept is a class of stimuli which have common characteristics. These stimuli are objects events or persons. A concept is ordinarily designated by its name such as pencils, bottles, pupil or freedom fighters, committed workers, and nasty places. All the concepts refer to classes or categories of stimuli. But some stimuli do not refer to concepts i.e. Subhash Bose, Sarala Das (Adi Kabi), Tagore's Gitanjali, Indo-Pak war of 1971 Annual Book Exhibition. These are particular stimuli (not classes of), persons or events. A concept is not a particular stimulus but a class of stimuli. The difference is between all freedom fighters and Subhash Bose. The concept freedom fighters includes Subhash Bose, but it includes many other fighters as well. The concept freedom fighters excludes all other war fighters. It is to be remembered that concept does not refer to particular stimuli but to classes of stimuli. The concept is a very broad one and it can include fighters of different types who fought for attaining freedom from British rule in various ways. Similarly, the concept bottles of varied sizes, colouration and shapes, pencils of different lengths, qualities and types.

Hence concepts are not always congruent with our personal experience, but they represent human attempt to classify our experience at least crudely.

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Concept attributes:

An attribute is a distinctive feature of a concept and thus varies from concept to concept. For example; Red triangles which has two attributes; colour and form or shape. Colour can vary from concept to concept and, therefore, qualifies as an attribute. We can indeed have red squares, red rectangles, red trapeziums red parallelograms. A concept is lake. The chief attribute which distinguishes a lake from an ocean and sea, on one hand and from a pool and pond, on the other hand, is size. Size is one of its major attributes. Size qualifies as an attribute because it can vary from concept to concept. Of course there are other attributes of lake.

Attribute Values - Values are the particular variations an attribute may undergo. Colour is an attribute. It may have several values; red, white, blue, violet, black. Similarly form may have several values; rectangles squares, rhombus, quadrangles. Concepts vary in the number of values their attributes have. Some concepts have attributes with only two values. A student (a concept) can be a boy or girl, dead or alive, married or single. Other concepts may have attributes with a range of values colour of an orange can vary from red-orange to yellow-orange. The colour, however, must not vary so much that we confuse an orange with a lemon or Mousumbi or shaddock. When an attribute has a wide range of values, the other attributes can be used to identify the concept in question. In identifying an orange the attributes of shape, size and texture can also be used.

Number of attributes:

The number of attributes varies from concept to concept. Red triangles has only two attributes-colour and form. Small red triangles has three attributes-size, colour and form. An orange, has four attributes-colour, size, form and texture. Some complex concepts have a dozen or more attributes such as socialism, human rights, democracy etc. As the number of attributes increases the difficulty of learning of concept increases. Scanning the values of a dozen attributes is strenuous and time consuming. Bruner and his associates suggest that to have easy learning the number of attributes can be reduced by attending to some attributes and ignoring others or by combining a number of attributes into a smaller number of patterns.

Dominance of the Attributes:

Among the attributes physical location is more dominant than the attributes of colour and form. Also colour form concepts such as red triangles are more dominant than number-colour concepts such as one red. Thus, dominance refers to the concept as well as to its attributes. Dominant concept has dominant attributes. Learning concepts with dominant attributes with fewer examples is easier than learning concepts with obscure attributes.

Informally, it is observed that students usually attend to certain points in their description of a concept but ignore other points that are equally important. In basing the concept of stars children may attend to the attribute of placement/visibility of

celestial bright bodies in the night sky and ignore the condition of twinkling, movement, size, colour etc. Teachers must give aural or visual emphasis to attributes which are obscure and yet important in identifying the concept. In defining concepts teachers traditionally resort to vocal inflection, hand and arm gesticulation, underscoring, diagramming, drawing and so on, to make obscure attributes obvious or dominant. Unless this emphasis is provided, the student will learn some attributes and not others and, thereby, fail to learn the complete concept.

Types of Concepts:

Attributes combine in three different ways to produce three types of concepts: Conjunctive concepts, disjunctive concepts and relational concepts.

a) Conjunctive Concepts:- The appropriate values of several attributes are jointly present. Ex-Three white half-shirts. It has three attributes (number, colour, form, joined together and each attribute has a particular value (respectively three, white, half-shirts). Conjunctive concepts are often the easiest to learn and to teach because of the additive quality of their attributes and values. Attributes and values are added together to produce a conjunctive concept. The student simply learn a list of attributes and appropriate values.

b) Disjunctive Concepts:- It is the one that can be defined in a number of different ways. Attributes and values are substituted for one another.

- Ex -
- a) Two figures and/or two circles.
 - b) Strike
 - c) Extra point in foot ball

The attributes are form and number and the value of the number remains the same. The concept is disjunctive because the value of the form can change - it can be a circle or any form.

Disjunctive concepts are often difficult to learn because of the seemingly arbitrary equivalence of their attributes. Disjunctive concepts are, in effect, rules which the student must learn to apply to equivalent stimulus situations. But the situations are not equal or equivalent until given the label. Teachers must invest greater effort in the teaching of disjunctive concepts.

Relational Concepts: It is the one that has specifiable relationship between attributes .

Ex- Distance and direction are relational concepts. Distance specifies the relationship between two points; it refers to the separation of these points. Direction also specifies a relationship between two or more points; it refers to the movement from one to another point.

More examples - Time, many, few, average, longitude, mass, weight, mother, father etc. Relational concepts are more difficult to learn as the concept does not adhere in the attributes themselves but in the particular relationships of the attributes. This sometimes creates lots of confusion in learning. For example, both the concept distance and the concept direction have as their attributes points in space and time. What distinguishes them is the difference in the relationship of the same attributes.

What is Principle:

A principle is a statement of the relationship between two or more concepts. Principles are sometimes called rules or generalisations.

- Ex-
- a) Rivers flow from hills to oceans.
 - b) Thirteen minus four equals nine.
 - c) The density of water is more than oil.
 - d) Three dimensional objects have six sides

The following statements are not principles:

- a) Shyam likes Rahim
- b) Rajiv claims he is stronger than any body in India.
- c) Congress won the last election.
- d) Who is afraid of Nandan Kanan Tigers

In the above set of statements concepts are there but those do not have relationships; basing on those concepts no rules or generalization can be made only the proper arrangement of the concepts results in satisfactory learning of principles.

When to teach concepts:

The teaching and learning of concepts must be related to the students' level of intellectual development. In teaching concepts during the period of concrete operations (age 7 to 11), the teacher must remember that the learner's thinking is oriented towards concrete objects in the immediate environment, that the child relinquishes the physical attributes of objects one by one, and that each grouping (or schema) remains an isolated organisation. In the period of formal operations, the adolescent child is capable of hypotheticodeductive and propositional

thinking. Although the teaching of concepts can and does occur during both periods, the teaching of principles proceeds more easily during the later period. Because the child's school learning of concepts is limited by his preschool learning, the school must often provide corrective experience to exclude irrelevant and include relevant attributes. Teacher should be in a position to decide on which concepts students should learn first and which they should learn later.

Educational uses of concepts and principles:

- 1) Concepts reduce the complexity of the environment.
- 2) Concepts help us to identify ~~xx~~ the objects of the world around us.
- 3) Concepts and principles reduce the necessity of constant learning.
- 4) Concepts and principles provide direction for instrumental activity.
- 5) Concepts and principles make instruction possible.
- 6) Concepts can be stereotypes. The teacher must sometimes provide corrective experience for an additional use of concepts: Stereotypes.
As concepts, stereotypes can sometimes be changed when the student is provided with a wider array of positive and negative examples than those which he has previously experienced.

The Teaching of Concepts

The teaching of concepts conform to the components of the basic teaching model. The process completes through seven steps steps 1 and 2 pertains to

instructional objectives. Step 1 requires a statement of the objective, step 2, a type of task analysis. Step 3 provides the student with the appropriate entering behaviour. Step 4 through 6 are specific instructional procedures for concept teaching and step 7 deals with performance assessment.

Step 1 - Describe the performance expected of the student after he has learned the concept.

The expected performance is the correct identification of new examples of the concept. For the concept 'Satellites' the expected performance could be that when new examples of satellites given the learner will correctly identify them. The description of terminal behaviour requires a performance quite different from rattling of the definition. The point is that the description of the expected behaviour should not include the requirement that the student give a definition of the concept.

Describing terminal behaviour has two purposes. First the teacher has a means for assessing the adequacy of the performance and for determining the need for further instruction. The students' expected performance clearly indicates to the teacher and to the students the degree of adequacy the students are to attain a particular time. Second, the students have a way of assessing their own performance and of determining when learning is complete. The students' self-assessments then become a way of generating their own reinforcement.

Step.2 : Reduce the number of attributes to be learned in complex concepts and make important attributes dominant.

In this step the values, number, dominance and relationship of attributes ~~x~~ can be put to pedagogical use. The analysis of the concept is decided to teach. The determination of the values and number of attributes can be made before instruction is underway. The determination of dominance of the attributes requires experimentation and observation of important attributes students are likely to ignore. Then procedures for teaching the concept are to be devised in two ways. Some of the attributes can be ignored and focus must be on those which the teacher thinks most important and/or the attributes can be coded into fewer patterns. But for a complete understanding of the concept, the learner would have to learn all the attributes listed with regard to a concept.

Step 3: Provide the student with useful verbal mediators

The teacher should ascertain the child's knowledge of the words used as attributes and attribute values and his knowledge of the relational words that are necessary. This step helps to see how the verbal and concept learning are related. The learning of certain names or labels (as verbal mediators) and specify type of verbal association facilitates the students' learning of a concept.

Step 4: Provide positive and negative examples of the concept.

A positive example of a concept is one which contains the attributes of a concept. A negative example is one which does not contain one or more

of the attributes. Positive examples of the concept bird are crow, parrot, penguin, cockoo. Negative examples are dog, cat, snake, fly, bat, bee. Use of positive and negative examples is a necessary condition for the learning of concepts.

The presentation of a mixed series of positive and negative examples is usually more effective than the presentation of a purely positive or a purely negative series. Presentation of only negative examples makes concept learning extremely difficult. As far as number, enough positive examples to represent the range of attributes and attribute values of the concept should be presented. In the case of negative examples, at least enough of these should be presented to eliminate irrelevant attributes which students are likely to include as part of the concept. Finally, direct experience or realistic examples are usually not preferable to simplified presentations of the concepts, such as line drawings, cartoons, diagrams and charts. These presentations help to achieve the effects of step 2, which directed to simplify the learning of the concept by focusing on its major attributes.

Step 5: Present the examples in close succession or simultaneously

This step is concerned with the order in which the examples as a whole and the types of examples (positive and negative) are presented to the student. The learning condition is contiguity - the almost simultaneous presentation of the examples of the concept. Simultaneous presentation is better because the student does not have to rely upon memory or previous examples. In teaching the concept of dog,

it is better to leave in view pictures of cats, birds, horses and dogs while presenting new pictures. By this maximization of contiguity and reduction of the information load on memory are taken care.

Step 6: Provide occasions for student responses and the reinforcement of these responses.

In concept learning reinforcement primarily provides informational feedback, which enables the learner either to separate positive and negative examples and to compose his list or to define the relationship of the various attributes. The primary purpose of reinforcement is to provide informational feedback to the student on the correctness of his responses. Since this feedback is crucial, any inconsistency, delay or failure to provide it will impair student learning. However, because the student knows which terminal behaviour he must acquire, he can to some extent monitor his own learning. Since reinforcement has motivational aspects, negative verbal feedback may impair concept learning by discouraging the student from making early guesses which can be confirmed. The teacher should remember to focus on the reinforcement of the students' responses and not on the student. The mode of the response should not be shifted, at least in the early learning of the concepts. It is quite possible, however, that the shift from spoken to written responses is less inhibiting than the shift from drawing to writing or writing to drawing.

Step 7: Assess the learning of the concept

In this step both contiguity and reinforcement are provided. This step emphasises generalisation, or the ability of the student to make the conceptual response to a new but similar pattern of stimuli. If the student is able to identify the new example of the concept, he has learned the concept. To provide reinforcement the student must be informed about the accuracy of his response. Several new positive and negative examples of the concept are to be presented and the student has to select only the positive examples. A small amount of practice of the definition, even when the students are not told how good the definition is, improves the quality of definitions. When the definition is difficult to formulate special training for formulation of concept definition should be imparted.



STATING EDUCATION OBJECTIVES IN OBSERVABLE BEHAVIOURS

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Aims and Objectives:

The whole educational system is directed towards certain aims such as utilitarian, cultural, vocational, all round development of the learner and the like. The school education programme is only a part of the total educational programme. However, it plays an important and even a vital role in the realisation of educational aims. "What can the school education programme achieve?", the question naturally arises. It can achieve only a part of these broad educational aims which we refer to as an objective. An objective is a point or an end-view of the possible achievement in terms of what a student is to be able to do when the whole educational system is directed towards educational aims.

Objectives in Measurable Terms

On the otherhand, educational objectives, learning experiences and evaluation procedures are the three interactive aspects of the educational process. Objectives play a key role in the instructional process. They serve as guide for both teaching and evaluation. Instructional objectives determine precisely and specifically what type of pupil performance is desired at the end of the instructional sequence. Historically in the Yale Report (1830) educational objectives have been stated as broad and ultimate goals such as exercising the mental functions of reasoning, imagination, taste, and memory. Good health, command of fundamental processes, worthy home membership, vocational efficiency, good citizenship, worthy use of leisure time and ethical character were the seven cardinal principles of secondary education, from 1918 are generally accepted even today. The same can be said for the four objectives of education formulated in 1938 by the Education Policy Commission of the National Education Association. Self Realization, human relationship, economic efficiency and civic responsibility. These ultimate aims are too vague to give focussed direction to curriculum development. In addition they can not possibly be realised or assessed

contd...2

until long after formal education has been concluded. It is therefore necessary to establish intermediate objectives that are logically derived from and related to those accepted ultimate objectives. Further wherever possible there intermediate objectives should be stated in terms of students behaviour that can be observed and measured. Thus educational goals must be stated in more precise and observable form to give directions to the important task of curriculum development and evaluation. Armed with a clear and specific list of teaching objectives, a teacher may consider the most appropriate procedures for evaluating progress made towards each objectives. He attempts to test what he has tried to teach by using techniques best suited to determine how well each objective is attained.

A number of attempts have been made to describe educational objectives in more realistic observable, precise and specific terms. Ebel (1956) suggested six ascending levels and attached to them ideal percentages he recommended for a good achievement test. These levels were: content details (20%) vocabulary (20%) facts (20%) generalization (10%), understanding (10%) and application (10%). Michael (1967) suggested the structure of intellect proposed by Guilford as a comprehensive basis for achievement examination, Scrivan (1967) suggested a comprehensive system of educational objectives that encompass. Cognitive, attitudinal, psychomotor and social dimensions.

Taxonomy of Educational Objectives

An important forward step in providing a framework within which educational objectives could be organised and measured was the publication of Taxonomy of Educational objectives. By Bloom et al (1956). The classified instructional objectives into what they call three major domains: cognitive, affective and psychomotor. It was based upon the assumption that in the process of sharing of new information. Changes largely occur

in the domains of cognitive, affective and psychomotor of the learner. The cognitive domain includes those objectives that deal with the recall or recognition of learned material and the development of intellectual abilities and skills. This domain is the core of much current curriculum and test development. The clearest definitions of objectives for the cognitive domain are phrased as descriptions of desired student behaviour - that is in terms of knowledge, understanding and abilities to be acquired. The large proportion of educational objectives fall into the cognitive domain. The affective domain includes objectives that emphasize interests, attitudes and values, and the development of appreciations and adequate adjustment. Objectives in this domain are not stated very precisely, and, in fact, teachers do not appear to be very clear about the learning experiences which are appropriate to these objectives. The psychomotor domain is concerned with physical, motor, or manipulative skills. For further specification of the taxonomy of educational objectives each of the three domains have been divided into a number of hierarchical categories of behaviours from simple to complex. For cognitive domain these six ascending levels are: knowledge, comprehension, application, analysis, synthesis, and evaluation. The five major categories of affective domain of the taxonomy of educational objectives are: receiving, responding, valuing, organization, characterization by a value or value complex. And finally seven major categories of psychomotor domain are: perception, set, guided response, mechanism, complex overt response, adaptation and origination. (A detailed description of all three domains of the taxonomy and their categories have been given in Annex. 1,2,3)

Since most of our school education curricula put emphasis largely upon development of intellectual development, the taxonomy of objectives in the cognitive domain has had a major impact on the development of educational curricula and methods by which they are assessed. The rationale for the hierarchy of behaviour into categories from simple to complex in all the three domains is based upon the assumption that each level is an extension of all previous levels. For example,

No attain an objective in the application category of cognitive domain requires (in theory, at least) that certain comprehension goals were achieved which inturn can be achieved only if certain information in the knowledge category is acquired.

Terms used in Objective based Evaluation:

Before we go further in preparing instructional objectives it is worthwhile to understand certain terms which are being used in different manners by different authors. The term education goal or aim is used in a general sense and very broad and wide term. Goals are used primarily in policy making and general programme planning. General instructional objective or simply objective is used in more explicit sense. The statement of objective contains non-behavioural (non action) verb, such as understands, knows, applies etc. the statement of specification, or specific objective or behavioural objectives or specific learning outcome contains a behavioural verb (action verb) such as writes draws, reads etc. These are the intended outline of instruction that has been stated in terms of specific and observable pupils performance. What occurs as a result of learning experience or educational experience is termed as the learning outcome while a stated desirable outcome before the student undergo the learning experience is specification or specific objective or specific learning outcome. And finally pupils performance is any measurable or observable pupils response in the cognitive, affective and psychomotor area that is result of learning.

While preparing instructional objectives it is possible to focus on different aspects of instruction. Some prefer to state the objectives in terms of what they are going and some other describe on the basis of learning process. When viewing instructional objectives in terms of learning outcomes it is important to keep in mind that we are concerned with the product of learning rather than with the proces of learning. Thus our focus stufts from the teacher to the pupil and from the learning experience to the learning outcome.

Criterion for Selecting behavioural objectives

In developing a list of objective for a particular course, however, the teacher is still faced with the problem of determining the adequacy of the final list of objectives. The following list of questions will serve as a criteria for this purpose.

1. Do the objectives include all important outcomes of the course ?
2. Are the objectives in harmony with the general goals of schools ?
3. Are the objectives in social principles of learning ?
4. Are the objectives realistic in terms of the abilities of pupils and the time and facilities available ?

General Instructional objectives and specific learning outcomes

In preparing a list of instructional objectives for a course of study we have two immediate goals in mind. One is to obtain as complete a list of objectives as possible. This is most likely to occur if we follow the procedures for selecting objectives described earlier. The other goal is to state the objectives so that they clearly indicate the learning outcomes that we expect from our instruction. The task of stating instructional objectives is simplified if we constantly keep in mind that we are making a list of intended outcomes of teaching learning situation.

- 1) We are not identifying subject matter content but the reaction pupils are to make to this content.
- 2) We are not listing the learning experiences of the pupils but the changes in pupils performance resulting from these experiences.
- 3) We are not describing what we intend to do during instruction but are making a list of the expected results of that instruction. Stating objective in terms of learning outcomes rather than learning process admittedly is easier said than done. If we

continually ask ourselves 'what should the pupils be able to do at the end of the course or unit of study, that they could not do at the beginning . Then we find that the pupils terminal performance has almost automatically become the center focus. We are then in a much better position to state our instructional objectives in terms of learning outcomes.

A list of objectives for a course or unit of study should be detailed enough to clearly convey the intend of the instruction and get general enough to serve as an effective overall guide in planning for teaching and testing. This can be most easily accomplished by defining objectives in two steps.

- 1) Stating the general objectives of instruction as intended learning outcomes.
 - 2) Listing under each objective a sample of specific type of performance that pupils are to demonstrate when they have achieved the objective. The procedure would result in statements of general instructional objectives and specific learning outcome like the following.
1. Understands scientific principles
 - 1.1 Describes the principles in his own words.
 - 1.2 Identifies examples of the principle
 - 1.3 States tanable hypothesis based on the principles
 - 1.4 Distinguish between two given principles.
 - 1.5 Explain the relationship between two given principles.

It is to be noted that the general objective starts right off with verb with precise wording directing to students outcome and free of course content . It should be unitary and realistic. Semilarly it should be noted that specific learning outcome or specification is merely a sample of the many specific ways to realise the general objectives. In case of specification to each statement should begin with a verb indicating observable responses. The specific learning outcomes are free of course content, realistic, unitary and stated in precise terms. Action verb is a key element in stating the specific learning outcomes the selection and clarification of these verbs play an important role in obtaining a clearly defined set of

instructional objectives. Ideally we would like each verb

- (i) to clearly convey our instructional intent and
- (ii) to precisely specify the pupil performance we are willing to accept as evidence that the general objectives has been attained. Unfortunately some verbs convey instructional intent well (e.g. identifies), other are more effective at precisely specifying the pupil responses to be observed (e.g. encircles, labels, underlines). Where it is necessary to choose between two types it would seem desirable to select that most clearly convey instructional intent and if needed, to further clarify the expected pupil responses in one of the following ways.

- (i) Add a third level of specificity to the list of objectives. E.g.
 - 1. Comprehend the meaning of written material
 - 1.1 Identifies the main thought in a passage
 - 1.1.1 Underlines the topic/sentence
 - 1.1.2 Selects the most appropriate title for the passage.
 - 1.1.3 Writes the main idea of the passage.
- (ii) Provide definitions of the action verb used in the specific learning outcomes. E.g.
 Illustrations of how to clarify expected pupils responses for selected action verbs.

<u>Action verb</u>	<u>Types of responses</u>
Identify	Point to, touch, mark, encircle, match, pick up.
Name	supply verbal label (orally or in writing)
Describe	supply a verbal account (orally or in writing) that gives the essential categories, properties and relationship.
Order	list in order, place in sequence, arrange, rearrange.
Construct	Draw, make, design, assemble, prepare, build.
Demonstrate	perform a set of procedure with, or without, a verbal explanation.

- (iii) Use sample test items to illustrate the intended outcomes.

* Sullivan, H.J. (1969) states that these six action verbs and their synonyms encompass all cognitive learning outcomes in the school.

Summary of steps for stating Instructional Objectives

The final list of objectives for a course, or unit should include all important learning outcomes (e.g. knowledge, understanding, skills, attitude, and should be stated in a manner that clearly conveys what pupils are like at the end of the learning experience. The following summary of steps provides guidelines for obtaining a clear statement of instructional objectives.

I. Stating the General Instructional Objectives

1. State each general objective as an intended learning outcome (e.g. pupils terminal performance)
2. Begin each general objective with a verb (e.g. knows, applies, interprets) omit "the pupil should be able to
3. State each general objective to include only one general learning outcome (e.g. not knows and understands).
4. State each general objective at the proper level of generality (i.e. it should encompass a readily definable domain of responses) stating from eight to twelve general objectives will usually suffice.
5. Keep each general objective sufficiently free of course content so that it can be used with various units of study.
6. State each general objective so that there is minimum overlap with other objectives.

II. Stating the specific learning Outcomes

1. List beneath each general instructional objective a representative sample of specific learning outcomes that describes the terminal performance pupils are expected to demonstrate.
2. Begin each specific learning outcome with an actionverb that specifies observable performance (e.g. identifies, describes).

3. Check to be sent that each specific learning outcome is relevant to general objective it describes.
4. Include a sufficient number of specific learning outcomes to describe adequately the performance of pupils who have attained the objectives.
5. Keep the specific learning outcomes sufficiently free from course content so that the list can be used for other units of the study.
6. Consult reference materials for the specific components of those complex outcomes that are difficult to define (e.g. critical thinking, scientific attitude, creativity).
7. Add a third level of specificity to the list of outcomes it needed.

Relating Test Items to Intended Outcomes

Instructional objectives encompass a variety of learning outcomes, and evaluation includes a variety of procedures. The key to effective evaluation of pupil learning is to relate the evaluation procedures as directly as possible to the intended learning outcomes. This is easiest to accomplish if the general instructional objectives and the specific learning outcomes have been clearly stated in terms of pupil performance. It is then simply a matter of constructing or selecting evaluation instruments that provide the most direct evidence concerning the attainment of the stated outcomes. Preparing test items that are directly relevant to the instructional objectives to be measured is primarily a matter of matching the performance measured by the test items to the type of performance specified by the intended outcomes. Stating the outcomes specifically as possible is useful in this regard, but careful judgement is still needed. If the intended learning outcome call for supplying the answers the test items should also require that answers be supplied rather than selected, if the intended learning outcomes call for identifying a procedure the test items should be concerned only. With the process of identifying rather than with more complex outcomes, if the intended learning outcome call for performing a procedure, the test items should require actual performance rather than verbal description how to do it. To sum up right from the process of identification of

general instructional objectives. upto constructing and or selecting suitable test items based upon students learning outcome depends much upon the creativity, insight, thoughtfulness and thorough mastery over this aspect of the test constructor.

References:

- Stanley, J.C and Hopkins, K.D. (1978)
Educational & Psychological Measurement and
Evaluation, New Delhi, Prontice Hall of India
Pvt. Ltd.
- Gronlund, N.E. (1981) Measurement and Evaluation in
Teaching. New York: MacMillan Publishing Co.
- Patel, A.B. (1975) Measurement and Evaluation: Theory
and Practice. Bombay: Himalayan Publishing House.

Table - 1

Major Categories in the Cognitive Domain of the
Taxonomy of Educational Objectives (Bloom, 1956).

Descriptions of the Major Categories in the
Cognitive Domain

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1. Knowledge. Knowledge is defined as the remembering of previously learned material. This may involve the recall of a wide range of material, from specific facts to complete theories, but all that is required is the bringing to mind of the appropriate information. Knowledge represents the lowest level of learning outcomes in the cognitive domain.
 2. Comprehension. Comprehension is defined as the ability to grasp the meaning of material. This may be shown by translating material from one form to another (words of numbers), by interpreting material (explaining or summarizing), and by estimating future trends (predicting consequences or effects). These learning outcomes go one step beyond the simple remembering of material, and represent the lowest level of understanding.
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3. Application. Application refers to the ability to use learned material in new and concrete situations. This may include the application of such things as rules, methods, concepts, principles, laws, and theories. Learning outcomes in this area require a higher level of understanding than those under comprehension.

4. Analysis. Analysis refers to the ability to break down material into its component parts so that its organizational structure may be understood. This may include the identification of the parts, analysis of the relationships between parts, and recognition of the organizational principles involved. Learning outcomes here represent a higher intellectual level than comprehension and application because they require an understanding of both the content and the structural form of the material.

5. Synthesis. Synthesis refers to the ability to put parts together to form a new whole. This may involve the production of a unique communication (theme or speech), a plan of operations (research proposal), or a set of abstract relations (scheme for classifying information). Learning outcomes in this area stress creative behaviors, with major emphasis on the formulation of new patterns or structures.

6. Evaluation. Evaluation is concerned with the ability to judge the value of material (statement, novel, poem, research report) for a given purpose. The judgements are to be based on definite criteria. These may be internal criteria (organization) or external criteria (relevance to the purpose) and the student may determine the criteria or be given them. Learning outcomes in this area are highest in the cognitive hierarchy because they contain elements of all of the other categories, plus value judgements based on clearly defined criteria.

Examples of General Instructional Objectives and
Clarifying Verbs for the Cognitive Domain of the
Taxonomy

Illustrative General Instructional Objectives	Illustrative Verbs for Stating Specific Learning Outcomes
Knows common terms Knows specific facts Knows methods & procedures Knows basic concepts. Knows principles.	Defines, describes, identifies, labels, lists, matches, names, outlines, reproduces, selects, states.
Understands facts & principles . Interprets verbal material Interprets charts and graphs Translates verbal material to mathematical formulas. Estimates consequences implied in data justifies methods and procedures.	Converts, defends, disti- ngishes, estimates, explains, extends, gen- eralizes, gives examples, infers, paraphrases, predicts, rewrites, summarizes.
Applies principles to new situations. Applies theories to practical situation. Solve mathematical problems. Constructs charts and graphs. Demonstrates correct usage of a procedure.	Changes, computes, demon- strates, discovers, mani- pulates, modifies, operates, predicts, pre-pares, produces, relates, shows, solves, uses.
Recognizes unstated assu- mptions. Recognizes logical fallacies in reasoning Distinguishes between facts and inferences Evaluates the relevancy of data Analyzes the organi- zational structure of a work (art, music, writing)	Breaks down, diagrams, differentiates, discrim- inates, distinguishes, identifies, illustrates, infers, outlines, points out, relates, selects, separates, sub-divides.
Writes a well-organized theme . Gives a well-organized speech. Writes a creative short story (or poem) Proposes a plan for an experiment Integrates learning from different areas into a plan for solving a problem Formulates a new scheme for classifying objects (or events, or ideas)	Categorizes, combines, compiles, composes, creates, devises, designs, explains, generates, mod- ifies, organizes, plans, rearranges, reconstructs, relates, reorganizes, revises, rewrites, summarizes, tells, writes.

Judges the consistency of written material.	Appraise, compares, concludes, contrasts, criticizes,
Judges the adequacy with which conclusions are supported by data .	describes, discriminates, explains, justifies,
Judges the value of a work (art,music, writing)by use of internal criteria	interprets,relates,summarizes, supports.
Judges the value of a work (art,music ,writing)by use of external standards.	

Table - 2

Major Categories in the Affective Domain of the Taxonomy of Educational Objectives (Krathwohl, 1964).

Description of the Major Categories in the Affective Domain

1. Receiving. Receiving refers to the student's willingness to attend to particular phenomena or stimuli (classroom activities textbook , music, etc.). From a teaching standpoint, it is concerned with getting, holding, and directing the student's attention. Learning outcomes in this area range from the simple awareness that a thing exists to selective attention on the part of the learner. Receiving represents the lowest level of learning outcomes in the affective domain.
2. Responding. Responding refers to active participation on the part of the student. At this level he not only attends to a particular phenomenon but also reacts to it in some way. Learning outcomes in this area may emphasize acquiescence in responding (reads assigned material), willingness to respond (voluntarily reads beyond assignment), or satisfaction in responding (reads for pleasure or enjoyment). The higher levels of this category include those instructional objectives that are commonly classified under interest; that is, those that stress the seeking out and enjoyment of particular activities.
3. Valuing. Valuing is concerned with the worth or value a student attaches to a particular object, phenomenon, or behaviour. This ranges in degree from the more simple acceptance of a value (desires to improve group skills) to the more complex level of commitment (assumes responsibility for the effective functioning of the group). Valuing is based on the internalization of a set of specified values, but clues to these values are expressed in the student's overt behaviour. Learning outcomes in this area are concerned with behaviour that is consistent and stable enough to make the value clearly identifiable. Instructional objectives that are commonly classified under attitudes and appreciation would fall into this category.

4. Organization. Organization is concerned with bringing together different values, resolving conflicts between them, and beginning the building of an internally consistent value system. Thus the emphasis is on comparing, relating, and synthesizing values. Learning outcomes may be concerned with the conceptualization of a value (recognizes the responsibility of each individual for improving human relations) or with the organization of a value system (develops a vocational plan that satisfies his need for both economic security and social service). Instructional objectives relating to the development of a philosophy of life would fall into this category.

5. Characterization by a Value or Value Complex. At this level of the affective domain, the individual has a value system that has controlled his behaviour for a sufficiently long time for him to have developed a characteristic life style. Thus the behaviour is pervasive, consistent, and predictable. Learning outcomes at this level cover a broad range of activities but the major emphasis is on the fact that the behaviour is typical or characteristic of the student. Instructional objectives that are concerned with the student's general patterns of adjustment (personal, social, emotional) would be appropriate here.

Examples of General Instructional Objectives and Clarifying Verbs for the Affective Domain of the Taxonomy.

Illustrative General Instructional Objectives.	Illustrative Verbs for Stating Specific Learning Outcomes
<p>Listens attentively Shows awareness of the importance of learning Shows sensitivity to social problems Accepts differences of race and culture Attends closely to the classroom activities.</p>	<p>Asks, chooses, describes, follows, gives, holds, identifies, locates, names, points to, selects, sits erect, replies, uses.</p>
<p>Completes assigned homework Obeys school rules Participate in class discussion Completes laboratory work Volunteers for special tasks Shows interest in subject Enjoys helping others.</p>	<p>Answers, assists, complies, conforms, discusses, greets, helps, labels, performs practices, presents, reads, recites, reports, selects, tells, writes.</p>
<p>Demonstrates belief in the democratic process. Appreciates good literature (art or music). Appreciates the role of science (or other subjects) in everyday life Shows concern for the welfare of others. Demonstrates problem-solving attitude Demonstrates commitment to social improvement.</p>	<p>Completes, describes, differentiates, explains, follows, forms, initiates, invites, joins, justifies, proposes, reads, reports, selects, shares, studies, works.</p>

Recognizes the need for balance between freedom and responsibility in a democracy. Recognizes the role of systematic planning in solving problems. Accepts responsibility for own behaviour. Understands and accepts own strengths and limitations. Formulates a life plan in harmony with his abilities interests, and beliefs.	Adheres, alters, arranges, combines, compares, completes, defends, explains, generalizes, identifies, integrates, modifies, orders, organizes, prepares, relates, synthesizes.
Displays safety consciousness. Demonstrates self-reliance in working independently. Practices cooperation in group activities. Uses objective approach in problem solving. Demonstrates industry and self-discipline. Maintains good health habits.	Acts, discriminates, displays, influences, listens, modifies, performs, practices, processes, qualifies, questions, revises, serves, solves, uses, verifies.

Table - 3

A Classification of Educational Objectives in the
Psychomotor Domain (Simpson, 1972).

Description of the Major Categories in the
Psychomotor Domain

1. Perception. The first level is concerned with the use of the sense organs to obtain cues that guide motor activity. This category ranges from sensory stimulation (awareness of a stimulus), through cue selection (selecting task-relevant cues), to translation (relating cue perception to action in a performance).
2. Set. Set refers to readiness to take a particular type of action. This category includes mental set (mental readiness to act), physical set (physical readiness to act) and emotional set (willingness to act). Perception of cues serves as an important prerequisite for this level.
3. Guided Response. Guided response is concerned with the early stages in learning a complex skill. It includes imitation (repeating an act demonstrated by the instructor) and trial and error (using a multiple-response approach to identify an appropriate response). Adequacy of performance is judged by an instructor or by a suitable set of criteria.

4. Mechanism. Mechanism is concerned with performance acts where the learned responses have become habitual and the movements can be performed with some confidence and proficiency. Learning outcomes at this level are concerned with performance skills of various types, but the movement patterns are less complex than at the next higher level.

5. Complex Overt Response. Complex Overt Response is concerned with the skillful performance of motor acts that involve complex movement patterns. Proficiency is indicated by a quick, smooth, accurate performance, requiring a minimum of energy. This category includes resolution of uncertainty (performs without hesitation) and automatic performance (movements are made with ease and good muscle control). Learning outcomes at this level include highly coordinated motor activities.

6. Adaptation. Adaptation is concerned with skills that are so well developed that the individual can modify movement patterns to fit special requirements or to meet a problem situation.

7. Origination. Origination refers to the creating of new movement patterns to fit a particular situation or specific problem. Learning outcomes at this level emphasize creativity based upon highly developed skills.

Examples of General Instructional Objectives and Clarifying Verbs for the Psychomotor Domain.

<u>Illustrative General Instructional Objectives</u>	<u>Illustrative Verbs for Stating Specific Learning Outcomes</u>
Recognizes malfunction by sound of machine. Relates taste of food to need for seasoning Relates music to a particular dance step.	Chooses, describes, detects, differentiates, distinguishes, identifies, isolates, relates, selects, separates.
Knows sequence of steps in varnishing wood Demonstrates proper bodily stance for batting a ball Shows desire to type efficiently.	Begins, displays, explains, moves, proceeds, reacts, responds, shows, starts, volunteers.
Performs a golf swing as demonstrated Applies first aid bandage as demonstrated Determines best sequence for preparing a meal.	Assembles, builds, calibrates, constructs, dismantles, displays, dissects, fastens, fixes, grinds, heats, manipulates, measure, mends mixes, organizes, sketches.

Writes smoothly and legibly	(Same list as for Guided
Sets up laboratory equipment	Response).
Operates a slide projector	
Demonstrates a simple dance	
step.	

Operates a power saw skillfully	(Same list as for Guided
Demonstrates correct form in	Response)
swimming	
Demonstrates skill in driving	
an automobile	
Performs skillfully on the	
violin	
Repairs electronic equipment	
quickly and accurately.	

Adjusts tennis play to	Adapts, alters, changes,
counteract opponent's style	rearranges, reorganizes,
Modifies swimming strokes	revises, varies.
to fit the roughness	
of the water.	

Creates a dance step	Arranges, combines, composes,
Creates a musical composition	constructs, creates, designs,
Designs a new dress style.	originates.

PREPARATION OF LOW-COST TEACHING AIDS

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Montesquieu once remarked, "He who would talk with me must first define his terminology". Thus let me first define what is meant by an instructional/teaching aid/teaching materials.

Instructional aid - Any device that assists a teacher to transmit his tutees facts, skills, attitudes, knowledge, understanding and appreciation. A visual aid is any instructional device that cannot be heard but can only be seen whereas an audio aid is any device which can be heard only but no seen. But an audio visual aid is any instructional device that can both be heard as well as seen.

NEED FOR LOW-COST TEACHING AIDS:-

The growth of population not being checked as desired, has given rise to a large number of primary schools in India more so in our state Orissa. The literacy rate is also not up to a comparable standard with other states of our country. In the other hand, the necessary inputs for education more so for primary education, are lacking, for example, a large number of schools in the villages are one-teacher schools and contingency funds of a primary rural school ranges from Rs.80/- to Rs.100/- approximately (or may be a little more) per annum. Such funds are quite inadequate to meet even the basic necessities of the school in terms of chalk, chalk-board, broom, water-pitcher, and other minor items. Text books and chalk-boards are the only educational materials found in most of the schools. The environment of the rural community is rich with resources e.g. crafts and skills. But these have been inadequately utilised in the educational process.

Most of our primary schools in Orissa, nearly 85% are located in the rural environment. They are ill-equipped and are in such a large number that it becomes practically

impossible to provide them all with the science kits and teaching aids even if they are designed and produced by any nodal agency such as NCERT or SCERT. In fact science kits and teaching aids mostly low-cost have been produced by NCERT and SCERT distributed to most primary schools. But there has been, it seems, no continuous supply of these kits and aids.

It therefore has been felt that to improve quality of education at the primary stage and that too at the rural situation, the teaching aids be prepared by the teachers and the taught with the involvement of the local community.

WHAT IS LOW-COST TEACHING AIDS ?

A low-cost teaching aid may be defined as aids which can be/are prepared out of materials which are either available at a throw away prices or free of cost. The characteristics of low-cost educational materials may be as follows:-

1. The materials are available easily either free of cost or at a very cheaper rate.
2. The materials do not require specialised skills and can be made by pupils, teachers and members of the local community.
3. The materials can be effectively and easily used by the science teacher and students in clarifying the pre set objectives of the topic to be taught.
4. The process of production of the materials be simple and inexpensive.
5. The teaching materials be, simple, accurate and appropriate, to-the-point and to the age level of the users.
6. The material stimulates thinking, reacting, discussing, experimenting or further study.
7. The production of the materials is not time consuming.

PROCESS OF DEVELOPING LOW-COST TEACHING MATERIALS:-

1. Defining the objective : First and foremost is that the objectives of the preparation of the teaching materials (audio-visual aids) be defined in terms of knowledge, skills and attitude and the needs of the users for which it is prepared.
2. Design to be prepared : The materials be designed and developed taking into consideration of the type of materials to be developed, its cost, relevance and the availability of the resources in the local environment.
3. Development of the material : After defining the objectives and preparation of the design the materials (aids) are developed in active cooperation of the teachers, students, specialists (craftsmen) of the community.

If the materials (aids) are to be produced to help the others then it is better to have a pilot testing of the materials by the teachers or researchers with selected sample users and on the basis of the results arrived at necessary improvements on the materials be made. If the materials are considered satisfactory through pilot-testing and modification then it be finalised for production. After that, if the materials are intended to be distributed then they may be produced in bulk and distributed to the nearby schools and teachers.

CLASSIFICATION OF THE MATERIALS:-

The educational materials to be developed from different materials can be classified in terms of :-

- i. Freely available and easily available (no-cost) materials in the locality such as plants, animals, minerals, scraps, waste from commercial and domestic use.
- ii. Easily accessible materials with very little cost such as masks, battery, bulbs, wire, card-boards, bamboo, seeds, shells etc.

- iii. Waste materials such as fuse bulb, bottle, can, cycle spokes, tooth-paste-caps, etc.
- iv. Inexpensive materials, viz., valve tube, match sticks, plastic tubes etc.

PROBLEMS OF THE TEACHERS IN PREPARING AUDIO VISUAL AIDS

Many things come on the way of the teachers to have an access to the audio-visual aids. Most of them do not know who makes the aids and money and materials available to have those aids. They also have paucity of time. They feel that their primary task is to complete the syllabus within the given time. Hence the teachers feel that there is no scope for them to do anything else. To some extent it looks apparant that the teachers are right as there are schools with single teacher; there are teachers who work two shifts and they take cāasses throughout the school hours without leisure periods from 9.00 A.M. to 3.00 P.M. or 10.00 A.M. to 4.00 P.M. Sometimes the teacher is to teach more than one subjects (several subjects) cannot often complete the overloaded syllabus which is the main concern of the education system. To sum up the problems, they face are:

- i. syllabus is large
- ii. time is short
- iii. number of students increasing in class-room.
- iv. teachers knowledge and competence about the aids is limited.
- v. low scale of pay etc. etc.

ROLE OF TEACHER :-

All the problems discussed above apart it would be better in the greater interest of the primary school children and the quality of education, if the science teacher in particular try their hands in preparing some low-cost teaching materials. Some of the examples of preparing low-cost teaching aids are discussed below:-

- | | | | |
|----|------------|---|--|
| 1. | Subject | : | General Science |
| | Topic | : | Expansion of air with Heat. |
| | Standard | : | V |
| | Objectives | : | To make the pupils understand that air expands on heating through a simple experiment. |

Contd...

Materials : A glass bottle, balloon, candle,
needed. two wooden pieces.

Preparation : Place the glass bottle on the
wooden pieces. The mouth of
the glass bottle is covered
with a balloon which has free,
expanding capacity. Give heat
to the bottle with the help of
burning candle. Make the pupils
observe. They can see the balloon
expanding gradually. The balloon
had expanded because the air
which was in the bottle expanded
when the bottle was heated with
a candle.

2. Subject : General Science
Topic : Friction
Objectives : To demonstrate the concept of
Friction; and To show that the
friction resists the motion of
the moving things.

Material : A card board length 60 cm.,
glass marbles, paste.

Preparation : Divide the card board in two
parts. Paste half of the Card
Board with boiled rice flour
paste and spread sand on it.
This will make half the surface
rough. The other half will
remain smooth. Take marble and
roll it on the Card Board. The
marble moves smoothly. When it
reaches the rough surface, the
motion will stop. This is
because friction has taken
place which will stop the
motion.

3. Subject : General Science
Topic : Pressure in liquids
Objectives : 1. To demonstrate the increase
of pressure with the increase
of the depth of the liquid
level.
2. To show, that the pressure
in liquids in all sides is
equal.

Materials Required : 1. An empty container having
three holes on the lengthy
side fitted tightly with
small plastic tubes.
2. A lengthy bottle.
3. Rubber tube (slightly longer
than the bottle).
4. Balloons - two

Preparation : 1. Close the holes of the empty
container with fingers and
fill water in it. Then
remove the fingers. The
water will come out through
the holes. Force of the
water from the lower hole
will be higher than that
of the upper hole.

This proves that the increase of pressure would lead to the increase of the depth of the liquid level.

2. Fill water in the bottle and put the rubber tube inside. Send air through the tube. The air bubbles formed beneath the water will gradually develop when these approach the surface of the water. Pressure beneath the liquid is higher than in the upper portion.
3. Fill a balloon with water and close the hole. Make four pin holes on four sides of the balloon. Water will spread out from all the holes. This shows that the pressure in liquid on all sides is equal.

Uses	:	The first and second experiments help to prove that when depth of the water is high, the pressure will also be high.
4. Subject	:	Science
Topic	:	The formation of a spectrum without using a Prism.
Standard	:	VII.
Objectives	:	To show that the sunlight is composed of different coloured rays through experiment using very simple materials available in the village.
Materials	:	Two mirror strips and a plain glass. A glass jar for water.
Preparation	:	A glass jar is filled with water. A small mirror strip is placed inside the vessel in standing position. By using another mirror, reflected sunlight is directed to the mirror kept in the water. The sunlight is dispersed and a distinct spectrum is formed either on the wall or on the roof.
Time	:	About 10 minutes.

We can prepare likewise examples of working model of Lungs and Periscope and innumerable other aids.

ROLE OF TEACHERS AT ELEMENTARY LEVEL

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Many things are told by experts regarding the role of teachers in elementary schools. Various recommendations are made by several commissions for the improvement of teaching and to make the process of learning more effective and meaningful at primary stage so that the enrolment and retention level increase. In spite of all these the problem is still there and needs a solution.

There is no doubt that science-teaching needs extra attention in the context of explosion of scientific and technical knowledge in the modern world. The child interacts with the physical environment at a very early age; not only with the various phenomena but also with the several household appliances as well as in the field of industry and agriculture; health and sanitation. To meet these needs good text-books, supplementary reading materials demonstration kits and newer methods of teaching are available. But above all these the teacher still continues to be the prime performer and teacher-component in the process of science teaching is to be accepted as supreme.

It is said that the teacher is the friend, philosopher and guide of his students in particular and of the society in general. It is now the time to examine how far it is true in case of a teacher who teaches science at elementary stage with the available facilities in his school plant. What is expected of him is too much to achieve suggested level of learning out-come. However, let him make efforts to look into the following aspects with what ever facility is available in his class-room.

1. An ideal teacher is expected to break the barrier and minimise the distance between himself and his students by his friendly and affectionate dealings. Let the children be friendly with the teacher and not get frightened by looking at his long face.

Contd...2..

2. The teacher is supposed to encourage the students to pick-up courage and raise questions in the class. It may so happen that some absurd/irrelevant questions may come up, but it is the duty of the teacher to screen those, sort out the good ones and suggest answers with suitable explanation for the benefit of the whole class.

3. The teacher is to inculcate the habit of extra consciousness of the student by way of developing the skill of observation and noting them down in somewhat a form of daily diary and encourage the child to independently think of an explanation.

4. The teacher while discussing and explaining the topics of the prescribed text will try to relate the same with what the child interacts in his immediate environment and has scope to learn in greater detail in higher classes. In this way the child will realise the relevance of the subject to his life and may get inspired and interested in the subject.

The above are only a few of many workable suggestions. There are teachers who do many more things and teach the subject in such an interesting manner that many students are now-a-days getting attracted to science stream of learning. But there are still reasons to worry about the present situation and make efforts to improve upon the teaching of science at primary stage.

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Standardisation of the Technical Terms adopted in
School Science Education

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The Vocabulary and grammatical patterns of a language can be grouped into two: i) Native Elements, which can take back to the earliest known stages of a language and ii) Borrowed Elements, which were imported at some time from a different language (Lehmann, 1962). Borrowing of vocabulary items into a language may be of various types among which contact (i.e., geographical, social and technical) between languages is the main factor. When the types of contact is being technical, the borrowing of technical terms into the standard native languages is generally made from a learned language.

The advent of scientific development and the widespread of European technology throughout the world have introduced new technical terms for which a particular language may not have all the technical terms in its lexicon. So, in Oriya, the adoption of the scientific terms from English, however, immeasurably greater than the other languages, though in western Europe, some of the technical terms have been adopted from Latin and Greek, the influence of English has greater impact on Oriya whenever science and technology are being adopted.

The adoption or translation of technical terms in Oriya can be seen under the following heads:

1. Lack of native scientific and technical elements;
2. For the sake of prestige; and
3. To facilitate easy remembrance and comprehension.

The usage of scientific and technical terms mostly with the base of western orientation, into the native Indian languages is a recent phenomenon. The fact, it is in India, we have a number of languages and dialects for all of which to have a standardized parameter to formulate a common procedure of translating those scientific terms, we feel to understand the difficulties we are subjected to, while incorporating those words/ terms at the secondary level of education, especially in a developing country like India.

The technical terms are being adopted in Oriya with the development of science and technology for which the language required new words.

Since, the use of transcribed technical terms in school science books limits access to education for the students, results in inferior education and thus created discrimination among the students (in their later phases of their studies). Accordingly, technical terms are undertaken from standard Oriya science books. These studies revealed a number of interesting facts.

i) The process of transcribing the technical terms into Oriya has been adopted for want of equivalent words in the Oriya lexicon.

ii) In some cases, the technical terms being transcribed into Oriya are different in their form and meaning.

iii) Among the technical terms used in the basic sciences, most of the terms are being used in English only. Those terms are found to have been transcribed into Oriya for easy usage, at the expense of the original strength of the words i.e., pronunciation and accent.

iv) Transcription of technical terms into the native language is one of the important factor responsible for the poor academic achievement of the school children. When the students enter into the higher educational levels, they will feel those technical terms which they knew in the regional language are again strange to them and again they have to learn the same vocabulary in English.

So far the technical words used in school science books are concerned, the terms are being introduced in Oriya due to the scarcity of native elements and are being imported into the science books as loan-words, loan creations or loan - translations, though the structure of the native language is being maintained in some cases. Sometimes, they develop differences in

meaning and form. In case of the technical terms used in chemistry books, most of the terms are remained as its English words along with the objects to which the words refer. But in other cases i.e., in Physics and Physical sciences, some terms have been transcribed into Oriya.

Loan Words: The technical terms are being adopted along with the object.

For instance, rāḍā/r	'Radar'
asileson	'oscillation'
cānel	'channel'
mubhi caamera	'movie camera'
niyuklik ecid	'nuclic acid'
pals	'pulse'

Loan Creation: New technology, new objects and practices creat new words in a language. Under this, the creation of technical terms are made on the basis of the materials already in the language.

For instance: byā/ sārḍha	'radius'
byā/ sa	'diameter'
Jāba kācha	'lens'
Uttala darpanā	'convex mirror'
abatala darpana	'concave mirror'
abruti	'frequency'
āyām	'amplitude'
Jaumuda	,'waxsealing'
rasmikendra	'focus'
upagraha	'settellite'

Loan Translation: Most of the technical terms used in science books are the direct transcribed forms of the English words being built up out of native raw materials. The words have been translated into its equivalent Oriya terms.

For instance:

ardha paribāhi	'semi conductor'
paramānu	'Atom'
dataparamānu	'donor atom'
grahītā paramānu	'acceptor atom'
betāra preraka	'radio transmitter'
srabya sanketa	'audio signal'
dooradarshana	'television'
Pāraswanika taranga	'ultrasonic wave'
prakhepaka jabakāca	'projection lens'

Loan translated words with Syntactic Expressions:

For instance, paramānabika ojanara ekaka 'unit of atomic weight'

drusti abicalā	'persistance of vision'
āloka - bīdyut kosa	'photo-electric cell'

In the oldest science books (before 35 to 40 years) the English versions of the translated technical terms were given next to the respective words and the teachers as well as the students could use the particular term in either way. So, there was no difficulty to understand the terms in their later field of education while the teaching was made in English. But, now-a-days the transcribed Oriya technical terms found in the text books are taught in Oriya only. Neither the teachers nor the students are using the equivalent English terms.

During my recent survey in regard to the subject with a number of students, many important facts are revealed. However, what is more surprising is the fact that more students, especially those who are in the higher studies, felt that they should devote more time to acquire those technical terms and the terms should have been taught to them in English at the school level. Though this mentality is prevailing among the school students, one of the important factors that need attention of the linguist and educationist of the state for the

easy and better comprehension of the technical terms at the college level, is the standardisation of these terms in Oriya. The need of the hour is that both the linguist and the educationist should come forward to formulate different foreign technical terms being used in school level with a color of easy understanding, comprehending, and acceptability of usage.

Standardisation of the vocabulary items, therefore, is a process by which the vocabulary items become the accepted items of the aspects of standard language which is the language of the educated native speakers. It is the process of language rearing so that it will become the adequate standard vocabulary items of the language community to which it belongs by continuous interaction.

Because of the absence of the standardisation of the technical terms used in Oriya school science books, the confusion arise with regard to the use of scientific terms in different science books. So, standardisation of these terms is necessary in order to avoid confusion in the use of the technical terms. If the attempts will be made for the standardisation of the technical terms in the regional language. So, the process of standardisation of the technical terms used in school science books can be done keeping the following factors in view.

1) Frequency of using the terms:

The frequency of the items i.e., which terms are more popular, well-known and frequently used in the text books by the educated native speakers, by the teachers as well as by the students, is one of the major factors to be given much priority while standardizing the terms. A yard-stick of common code for standardizing the technical terminology should be evolved.

2) Survival:

Newspapers, regional technical journals and the vocabulary by the educated, neo-educated mass are all purveyors and agents of transmitting and disseminating the translated technical words in the native languages responsible for the existence of long life of the technical words.

3) Comprehension:

The learning difficulties should be adopted to the mental horizons/capabilities of the students.

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References:

- a) Hockett, C.F., 1958, A course in Modern Linguistics, The Macmillan company, N.York.
- b) Lado, Robert, 1971, Language Teaching, A Scientific Approach, Mc.Graw Hill Inc., N.York.
- c) Lehmann, W.P . 1962, Linguistics; an Introduction, Holt, Rine hart and Winston Inc., N.York.
- d) Smith, Neil and Wilson Deirdare, 1979, Modern Linguistics, Penguin Books, London.

Minimum Levels of Learning in Environmental Studies

Introduction

1. Environment is generally taken to consist of two main aspects: natural and human, i.e. man-made or social. This division is often reflected in the curriculum of Environmental Studies (EVS) where, traditionally, these have been labelled as Parts I and II separately, or Social Studies and Science, respectively. In fact, the total environment should be viewed integratively as the product of the interaction among the man, the natural environment and the social environment.

2. The proposed curriculum plan tries to include all these three dynamic and mutually interactive elements. It has been built around 10 major competencies. The first one is concerned with one's well-being in the context of natural and social environment. The next five deal with the social aspects such as socio-civic environment, the world of work, spatial relationship between man and his natural environment, man's past-present relationship, and some common problems concerning environmental interaction. The last four major competencies relate to selected components of natural environment pressing on the scientific aspect besides the personal and social ones, and include the elements of health, living things, non-living things, and the earth and the sky.

3. The ten major competencies aimed at the cognitive, affective and psychomotor domains of development together with the content elements associated with them are enumerated below:

The pupil

- (1) acquires awareness about one's well-being in the context of social and natural environment.

- (ii) Explores important aspects of one's socio-civic environment and comprehends their working.
- (iii) Knows about various people at work and appreciates the importance about the 'world of work'.
- (iv) Understands and interprets the spatial and interactive relationship between man and his environment.
- (v) begins to see the relationship between man's past and present, and to hold the past in its proper perspective.
- (vi) Senses common but simple and easily observable socio-economic situations and problems, analyses them and seeks possible solutions at his level of experience.
- (vii) Understands the factors contributing to the preservation of good health.
- (viii) Develops skill in gathering and classifying information about living things from one's environment, and drawing simple inferences.
- (ix) Observes and examines some common characteristics of non-living things.
- (x) Observes simple phenomena on the earth and in the sky and draws inferences.

4. It may be pointed out that the proposed scheme of MLLs avoids drawing any hard and fast dividing line between various components of Environmental Studies and expects them to be treated in a correlated manner. In the ultimate analysis, every child has to conduct himself/herself as a socially responsible citizen as he/she grows, has to become aware of environmental conditions and the need

to protecting it, and has to broaden his/her socio-economic and scientific outlook with the attainment of greater maturity. It is for the achievement of such broad life goals that the competencies stated above have to be mastered during the initial stage of education.

5. In order to develop these major competencies grade by grade, they have been delineated into specific sub-competencies anchoring them with relevant content units, and have been presented as a flow chart in a sequential and interconnected manner. The horizontal relationship of different competencies within a grade and vertical articulation established across grades have to be kept in view in the process of teaching as well as evaluation. Therefore, a particular numbering system is followed in presenting these competencies including pertinent content elements. For example, the sub-competency numbered 5.4.2 means that it belongs to the fifth major competency, for Class IV, and second competency in the study of Progress of Man from Early Times to the Present Age (see statement of MLLs).

6. Each competency or sub-competency represents a specific curricular objective describing expected learning outcomes. Keeping these expected outcomes of learning in view, effective and attractive procedures of teaching and learning should be followed. The competencies under EVS are such that the techniques of teaching can be conveniently made activity-based. The child should, therefore, be given ample opportunities both individually and in groups, as also within the classroom and outside to observe, explore, analyse, interpret and appreciate the natural and social environment of which he/she is an integral part. The textbook and other aids should be used for reinforcement of these processes.

7. Evaluation of learning outcomes should be integrated with the process of teaching and children's activities on a continuous basis. In the first two classes it should be largely observational and oral. Written tests may be gradually introduced from Class III but should be supplemented by other techniques. The capacity of understanding and application of knowledge acquired rather than rote memorization should be particularly stressed in formal as well as informal examinations.

Statement of MLs in Environmental Studies

Areas	Class I	Class II	Class III	Class IV	Class V
1. The pupil acquires awareness about one's well-being in the context of social and natural environment.	1.1. Our body and its cleanliness	1.2. Our food and shelter	1.3. Rules of safety and orderly behaviour	1.4. Precautions against common accidents.	1.5. Care against persons of bad habits and bad character
	1.1.1. Identifies the main parts of the body.	1.2.1. Understands the need of food for health	1.3.1. Appreciates the need for orderly behaviour in home, school and public places.	1.4.1. Identifies common situations leading to accidents in his environment	1.5.1. Knows about common crimes in his locality, e.g. theft, decoity, violence and trespass.
	1.1.2. Understands the importance of keeping them clean	1.2.2. Sees relationship between clean food and water, and diseases.	1.3.2. States in queue and waits for his turn	1.4.2. Sees relationship between accidents and lack of precaution	1.5.2. Sees relationship between crimes and bad habits and bad behaviour, e.g. alcoholism, bullying, lack of consideration for others, etc.
	1.1.3. Recognizes the need of clothes and seasonal variation in them (wherever applicable)	1.2.3. Appreciates why the house is an essential need (wherever applicable)	1.3.3. Interprets important road symbols (as applicable)	1.4.3. Knows some basic measures to be taken following an accident	1.5.3. Suggests possible safeguards, as also measures to prevent crimes.

Areas	Class I	Class II	Class III	Class IV	Class V
	1.1.4.Practises personal cleanliness including toilet habits.	1.2.4.Shares activities to keep the house and surroundings neat and tidy	1.3.4.Observes important rules of road (as applicable)		
	1.1.5.Observes how animals and birds keep their bodies clean	1.2.5.Observes and compares various kinds of shelters including those of animals, birds and insects.			

2.The pupil explores important aspects of one's socio-civic environment and comprehends their working

2.1.1.Identifies relationship of the different members of the family with himself and among themselves	2.2.1.Identifies important public places such as the school,panchayatghar,etc.in the locality and knows their importance	2.3.1.Enquires about the functions of such public institutions as hospital,police station,post office,panchayat/municipality,court and bank.	2.4.1.Finds out how the panchayat municipality is useful for us	2.5.1.Understands broad relationship between the Central, State and local-self government.
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Areas	Class I	Class II	Class III	Class IV	Class V
	2.1.2.Shows due courtesy to elders, peers, etc.in the family and among the relatives and neighbours.	2.2.2.Realizes the importance of going to the school, and attends it regularly and in time.	2.3.2.Knows about the importance of some district level functionaries, e.g. D.M., S.P., etc.	2.4.2.Enquires how the panchayat/municipality is run	2.5.2.Describes simple facts about the Union (Central) and State Level governments.
				2.4.3. Explains why the panchayat and municipality are called local-self governments.	2.5.3.Interprets the use of terms like 'democracy' and 'union' for our country as unique features.
					2.5.4.Realizes the importance of the right to vote in a democracy.
3.The pupil knows about various people at work and appreciates the importance of the 'world of work'	3.1.Parents and other members of family at work	3.2.Occupations in the neighbourhood	3.3.Life and activities of some people at work: food producing	3.4.Manufacturing Food producing articles.	3.5.Other important workers: food producing

Area	Class I	Class II	Class III	Class IV	Class V
	3.1.1.Observes various members of family at work in home.	3.2.1.Observes and lists occupations carried on in the locality	3.3.1.Lists the occupations engaged in producing various articles of daily need.	3.4.1.Recognizes the importance of manufacturing articles.	3.5.1.Realizes the importance of work of those engaged in transport and communication,e.g.railways,construction of roads and bridge, working of radio, television, etc.
	3.1.2.knows about occupations of parents of family for earning livelihood.	3.2.2. Finds out their usefulness	3.3.2. Identifies those who produce food stuffs, e.g. farmer,dairymen, fisherman and herdsman	3.4.2.Identifies some occupations related to them	3.5.2.Understands the importance of trade and commerce.
	3.1.3.Shares information with peers about occupations of the parents.	3.2.3.appreciates the variety in occupations and its need.	3.3.3.Describes their main activities and their ways of life.	3.4.3.Gathers information about the activities and life of a few such workers(selected examples)	3.5.3.Realizes the importance of the work of a soldier, policeman,teacher, etc.and compares their work with that of a farmer and a manufacturer.
		3.2.4.Realizes the importance of work		3.4.4.Compares the work of a farmer with that of a craftsman	3.5.4.Appreciates the existence of increasingly large variety in occupations and interdependence among them (Extension of 3.2.3)

Areas	Class I	Class II	Class III	Class IV	Class V
4.The pupil understands and interprets the spatial and interactive relationship between man and his environment	<p>4.1.Our locality (village/Mohalla)</p> <p>4.1.1.Identifies some important local land features, e.g. river, pond,ridge,knoll, etc.</p> <p>4.1.2.Recognizes some common animals birds and insects.</p>	<p>4.2.Our neighbourhood</p> <p>4.2.1.Uses sunrise and sunset to find out directions</p> <p>4.2.2.Relates the nature of weather with seasons,and seasons with human activities,plants, birds, etc.</p> <p>4.2.3.Gathers information about various uses of land features of locality by man</p>	<p>4.3.Our district</p> <p>4.3.1.Draws a sketch of the classroom and a free-hand sketch map of school and locality or part of it</p> <p>4.3.2.Identifies direction on a map/sketch map</p> <p>4.3.3.Locates the district in the State and the State in India</p>	<p>4.4.Our State/UT and our country</p> <p>4.4.1.Knows the names and location of States and UTs of India.</p> <p>4.4.2.Locates his State/UT in reference to adjacent States and UTs, international boundary,coast-line etc.(as applicable)</p> <p>4.4.3.Desc ribes main physical features and climatic conditions of the State.</p>	<p>4.5.Our country and the world.</p> <p>4.5.1.Identifies major and water masses,poles and equator on the globe</p> <p>4.5.2.Locates India in Asia and with reference to Indian Ocean and neighbouring countries.</p> <p>4.5.3.Identifies distribution of main physical features on map and describes them.</p>

Areas	Class I	Class II	Class III	Class IV	Class V
		4.2.4.Reads information from a given sketch map of the locality	4.3.4.Knows about important physical features,climate, vegetation,crops and industries of the district.	4.4.4.Knows the distribution of main natural resources of the state and their importance for the country,if any	4.5.4.Describes main characteristics of Indian climates.
	4.2.5.Recognizes some common trees, birds,crops, etc. of the locality.		4.3.5.Traces the map of the district and shows physical features, important places and routes.	4.4.5.Understands distribution of main crops (in the context of climate and terrain),important occupations and location of industries.	4.5.5.Describes and locates important natural resources of India.
			4.3.5.Describes life of people of the district (a few selected examples)	4.4.6.Describes the life of typical people in the State (a few selected examples)	4.5.6.Understands the distribution of main crops and location of main industries in India.
				4.4.7.Knows importance and location of chief places and routes of the State	4.5.7.Knows the importance and location of significant places and routes in India.
				4.4.8.Knows how to use an atlas	4.5.8.Describes life of people in various important parts of India (a few examples to be selected)

Areas	Class I	Class II	Class III	Class IV	Class V
	5.1.2.Shares experience with peers about fairs visited and festivals celebrated.	5.2.2.Participants and understands the similarities and differences in celebrating national festivals and other celebrations.	5.3.2.Understands why his life was very different from ours.	5.4.2.Sees relationship between these developments and rise of civilization(selected examples from India)	5.5.2.Realizes that people in various parts of the country took part in the freedom struggle.
		5.2.3.Knows about the national flag	5.3.3.Understands the mode of his life and circumstances in which he lived	5.4.3.Appreciates the role of science and technology towards modern development	5.5.3.Appreciates the part played by Gandhiji in freedom struggle along with others (some to be selected from the state concerned)
		5.2.4.Singhs national anthem	5.3.4.Knows simple facts about the life of people in some important parts of India, 5000 years ago	5.4.4.Knows about important aspects of cultural life, e.g.music, art and sculpture and their importance for happiness of man (selected examples from India)	5.5.4. Infers why freedom of the country is invaluable and needs to be protected at all costs by all of us

Areas	Class I	Class II	Class III	Class IV	Class V
6.The pupil senses common but simple and easily observable socio-economic situations and problems, analyses them and seeks possible solutions at his level of experience			6.3.Small family happy family (small family norms)	6.4. National unity	6.5.Our Development in a fast changing world.
			6.3.1.Observes the difficulties faced by large families living in small houses	6.4.1.Appreciates the need of national unity for protecting our freedom and making progress	6.5.1.Knows about some fast development in the world today,such as in transport,communication, medicine, etc. and the need of our country to keep pace with these
			6.3.2.Observes overcrowding in hospitals,trains,buses,etc.(as applicable) country enriches	6.4.2.Understands how variety in resources,environment and life of the people in our country enriches our unity	6.5.2. Realizes the need of peace,hard work and cooperation among all people and all regions for a quick development

Areas	Class I	Class II	Class III	Class IV	Class V
			6.3.3.Comperes the situation regard- ing over-crowding today with that of earlier days by talking to elders in the locality.	6.4.3.Knows import- ant facts about Indian culture and contribution of different regions to its richness	6.5.3.Understands that fast increase in the population of our country is a serious obstacle in our development
				6.4.4.Knows import- ant facts about our national sym- bols and under- stands their significance	6.5.4.Knows about population census taken every decade
					6.5.5.Finds out in- crease in population according to each census since Inde- pendence and under- stands its impli- cations.
7.The pupil under- stands the factors contributing to the preservation to of good health			7.3.Functions and care of different parts of body	7.4.Nutrition, pol- lution and clean- liness	7.5.Prevention of diseases and keep- ing fitness

Areas	Class I	Class II	Class III	Class IV	Class V
			<p>7.3.1. Understands important functions of human body, such as digestion, respiration, blood circulation, etc.</p>	<p>7.4.1. Classifies food stuffs according to nutritive functions and understands the need of balanced diet.</p>	<p>7.5.1. Knows about major sources of diseases</p>
			<p>7.3.2. Knows how to take proper care of such parts of the body as eyes, hair and teeth</p>	<p>7.4.2. Knows how food and drinking water get contaminated (Extension of 10.3.14)</p>	<p>7.5.2. Understands the usefulness of vaccination to prevent communicable diseases</p>
				<p>7.4.3. Conducts simple experiments to purify drinking water</p>	<p>7.5.3. Suggests ways of collecting and disposing of garbage.</p>
				<p>7.4.4. Relates unhygienic conditions with the spread of diseases</p>	<p>7.5.4. Applies simple first-aid skills</p>
					<p>7.5.5. Reads thermometer to know body temperature</p>
					<p>7.5.6. Participates in child-to-child programme to save life of ailing infants, e.g. from diarrhoea</p>

Areas	Class I	Class II	Class III	Class IV	Class V
8.The pupil develops skill in gathering and classifying information about living things from one's environment and drawing simple inferences			8.3.Living things: their characteristics and classifications.	8.4.Living things: their usefulness to man.	8.5.Living things and environment
			8.3.1.Observes local surrounding and classifies things into (i) living and non-living,(ii) natural and man-made	8.4.1.Identifies some important ways of using plants and animals	8.5.1. Gives examples that animals and plants adapt themselves to environment.
			8.3.2.Understand similarities and differences between animals and plants	8.4.2.Identifies some harmful insects and weeds	8.5.2.Visualizes present and possible future harmful effects from diminishing forest cover, soil erosion and pollution (extension of 10.4.1●)

Areas	Class I	Class II	Class III	Class IV	Class V
			8.3.3. Identifies main parts of a plant	8.4.3. Examines the need of caring and protecting animals and plants, and describes simple ways of doing so	8.5.3. Knows the pre-sent schemes (a few) to increase and improve forest cover, cleaning rivers, tanks and such others, e.g. the Ganga.
			8.3.4. Classifies common plants on the basis of size, life span and seasonality	8.4.4. Names the national bird, animal and flower (also state animal, birds, etc. as applicable)	
			8.3.5. Observes food habits of different animals and birds	8.4.5. Takes part in tree-plantation programmes of the locality and appreciates their importance.	
			9.3. Common materials and their properties	9.4. Materials (matter) and their properties	9.5. Energy and work
9. The pupil observes and examines some common characteristics of non-living things.					

Areas	Class I	Class II	Class III	Class IV	Class V
			9.3.1.Identifies common materials on the basis of some easily observable properties, e.g. colour, texture and hardness	9.4.1.Knows the three states of matter-solid, liquid and gaseous	9.5.1.Knows important sources of energy used in daily life
			9.3.2.Classifies given materials according to these properties	9.4.2.Observes the three states of matter in respect of water	9.5.2.Understands how energy helps in doing a work
				9.4.3.Generalizes about inter-changeability of these states.	
10.The pupil observes simple phenomena on the earth and in the sky and draws inferences			10.3.The earth and the sun 10.3.1.Earth-sun relation and consequences	10.4.The earth and the sky 10.4.1.Heavenly bodies	10.5.Man, Science environment. 10.5.1.Appreciates the importance of science in our daily life.

Areas	Class I	Class II	Class III	Class IV	Class V
			10.3.2.Describes the shape of the earth (evidence of earth and moon photograph)	10.4.2.Knows difference between sun, earth and moon (simple observable facts).	
			10.3.3.Relates occurrence of day and night to the rotation of the earth	10.4.3. Recognizes pole star and Great Bear (Saptarishi) and uses them for finding direction at night	
			10.3.4. Observes differences in the duration of day-light over the year.	10.4.4.Observes phases of the moon	
			10.3.5.Generalizes about the occurrence of seasons.		
			10.3.6.Observes consequences of the occurrence of seasons (some instances).		
			10.3.7. Air in our life	10.4.5.Weather phenomena	10.5.1.Describes some outstanding achievements of science (discoveries and inventions)

Areas	Class I	Class II	Class III	Class IV	Class V
			10.3.8.Explains the usefulness of air	10.4.6.Knows how related (certain weather phenomenon)	
			10.3.9.Knows how air gets polluted	10.4.7.Knows about different forms of water affecting weather, e.g. humidity, fog, cloud, hail and snow	
				10.4.8.Observes various weather phenomena and records them with pictographs	
		10.3.10.Water in our life		10.4.9.Soils in our life	10.5.2.Knows about dangers from the misuse of scientific knowledge, e.g. in war
			10.3.11.Describes different uses of usefulness of soils	10.4.10.Knows about	
			water		
			10.3.12.Knows about different sources of water	10.4.11.Classifies soils of the locality according to sizes of its particles and fertility.	

Areas	Class I	Class II	Class III	Class IV	Class V
			10.3.13.Locates various sources of water in the locality	10.4.12.Finds out how soil is kept fertile	
			10.3.14.Finds out how water gets polluted	10.4.13.Realizes the need of protecting soils from erosion	10.5.3.Realizes the need of scientific ways of using environment and natural resources including conser- vation, e.g. soils, minerals, water and forests (extension of 10.4.13 and 8.52)

ABOUT THE MODULE

Seven modules based on Class-V text-book of the State of Orissa were prepared during the programme by the groups comprising of participants and resource persons mentioned against each module. The modules were framed basing on the objectives formulated for the programmes.

Each module related to one Chapter of the text-book consists of three section. The first one provides the description about the major and minor concepts related teaching strategies, teaching activities and essential teaching aids concerning each activity.

The second section comprises evaluation tools which are based on the knowledge required for minimum level of learning and bit higher knowledge for general understanding of facts.

The third section describes about a model of a lesson plan from the unit concerned for the use of classroom teacher in day-to-day teaching learning condition.

MODULE-1 Group - 1

UNIT - The Earth and the Sky

Participants

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Sarat, Mayurbhanj.
6. Sri Jagannath Bagati,
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Minor Concept	Suggested Teaching strategies	Suggested Activities	Suggested teaching aids
1	2	3	4
1) <u>Celestial bodies</u>	Observation of the clear sky during day time, during dark night and during moonlit night. Students should be advised not to look at the sun directly.	1) Visit to Planetarium. 2) Visit to Regional Science Centre and Science Museums. 3) Visit to observatories 4) Projected through slides, documentary films and video cassettes.	1) Orary 2) Chart showing a) picture of a clear sky during night b) Saptarshi Mandal (great bear) with pole star. c) Solar system d) Earth and the moon 3) Projector.
2) <u>Planets and Satellites</u>	Observation of clear morning and evening sky. Classroom discussion.	1) Students will observe the clear sky in the morning and at the evening. 2) They will observe the sun with blue glass instead of naked eyes. 3) They will identify planet Venus (Evening star/ morning star) looking at the eastern sky during winter & western sky during summer. 4) They will identify planet Mars by its red-ish colour.	Model of solar system Chart of solar system, Orary, Top (G.S.), Telescope, Implements to make track on the ground.

- 5) They will have an idea with regard to rotation of earth around its own axis by rotating 'Top' (Rd.)
- 6) Observation of Saturn and Mars by telescope.
- 7) A circular track will be made on the ground and the students will make a round over it from West to East.

3) M o o n:

- 1) Moon is the only satellite of earth.
- 2) It has no light of its own.
- 3) It is being lighted by the Sun.
- 4) There is no possibility of life on lunar surface because of the absence of air and water.
- 5) Moon rotates about its own axis as well as around the earth.
- 6) Moon is hard and very cold.
- 7) There are many mountains and hillocks along with small and big holes.

Demonstration, Observation and discussion.

- 1) Demonstration and observation of a sphere (foot ball) by putting light on it in a dark room.
- 2) Study of the requirement of air and water for survival of living organism.
- 3) Orary demonstration
- 4) Observation of lunar surface by telescope.

Torch and battery,
Foot ball or any
opaque spherical
body.

Orary

Model of Moon

1	2	3	4
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8) Lunar surface is covered with thick and powdery dust.

9) The lunar astronauts landed on a plane surface of the moon.

4) Artificial Satellite

1) Many artificial satellites have been launched to the space from earth surface and they revolve around the earth.

ii) Aryabhata & Bhaskar are two artificial satellites launched by India.

iii) In 4th October, 1957 Soviet Union first launched artificial satellite to the space and by now many countries have launched the same to the space.

iv) Many kinds of work is being done by the artificial satellites, Ex-News Telecast, Wireless communication, Television imparting Education, Advance weather forecast.

v) The scientists have also launched satellites to other planets such as Mars, Venus, Jupiter and to the Moon.

1) In the open playground a pole will be fixed. A student will be blind folded. A rope will be tied to the pole and the other end will be caught by the student loosely. He will be asked to move straight. The movement of the boy will be observed by other students and will be able to comprehend the movement of satellite around the earth.

ii) A ladybird (एक लडकी) will be tied by a thread and the other end will be held by a student. The movement of the insect will be observed by others to have an idea about the revolution of satellite.

iii) Observation of T.V. programmes on artificial satellites.

A pole, rope of 10mts. Handkerchief. Chart showing the figures of a satellite.

5. Rectilinear propagation of light

Light travels in a straight line.
Demonstration, Experimentation, Observation, Discussion.

- i) A straight plastic tube/rubber tube of 50cm. long would be taken. At one end a candle would be lit and at the other end students would be asked to observe. At the second stage one end of the tubing will be tilted a little and students will be asked to observe the change.
- i) A straight 50cm long plastic/rubber tubing or even a straight stalk of papaya leaf or caster seed leaf, a candle match box.

- ii) An empty chalk box would be taken. The open side would be covered completely by a glass or transparent polythene sheet. At any place of the box other than the transparent side a small hole is to be made so that an Agarbati can be introduced. A burning Agarbati would be introduced into the box. The box would be filled with Agarbati smoke thickly. The agarbati would be removed

- ii) Empty chalk box, a glass plate or a polythene sheet, gum, Agarbati, match box.

A burning candle would be placed near the hole by making room completely dark. Ask the students to observe into the box through the transparent side of the box.

- iii) The cardboard experiment as described in the text book.

Three pieces of equal sized card board, candle, match box.

6) Shadow formation

- i) Shadow is being formed due to rectilinear propagation of light.
- ii) Light is being obstructed by opaque substance thereby forming shadow.
- iii) The shape and size of shadow is dependent on the object distance and shape and size of the object.
- iv) Shadow is visible when it is formed on a screen.
- v) There are two types of shadow:
 - a) Umbra
 - b) Penumbra

Shadow formation games
Candle
Match box.

- a) Make the room completely dark. A burning candle would be kept on the table. Keep the palm open nearer to the wall in front of the candle. Manipulate the fingers in the open palm in the following manner. Bend the fore finger from the middle, keep the thumb straight upward, move the little finger little downward. Now if you observe keenly you can find the shadow looking like a head of a dog. Like wise by the help of two palms different types of shadows indicating the shape and size of different animals can be formed.

- b) Keep hanging a rubber ball by the help of a string in front of a burning candle in the dark room. Keep a screen in other side of the rubber ball. Observe keenly the ~~xxx~~ shadow formed on the screen. The central dark portion of the shadow is umbra & little less darker zone of the shadow is

Candle,
Rubber ball
Screen
Match box

~~penumbra~~

1	2	3	4
---	---	---	---

7. Knowledge of time from
shadow formation

- | | | | |
|--|--|--|---|
| i) Shadows of different sizes formed from Sun rise to Sun set. | Observation of clear sky during day time and discussion. | 1) Preparation of sun-clock as described in text-book (page-8) | i) Small straight sticks ii) Circular paper sheets iii) Pencils |
| ii) The more sun rises up the shorter shadow becomes. | | 2) Students will be asked to stand under sun in morning at noon and at evening will be advised to observe the process of formation of their own shadow and its direction and size. | iv) Compasses v) Some sheets of plane paper. |
| iii) At noon shadow formed is smallest in size. | | | |

- iv) After noon when sun starts descending to western sky the shadow formed in opposite direction to the previous one and size becomes longer and longer.
- v) At the time of sun rise and sun set the length of shadow becomes longest.
- vi) By observing keenly the principle of shortening and lengthening of the size of the

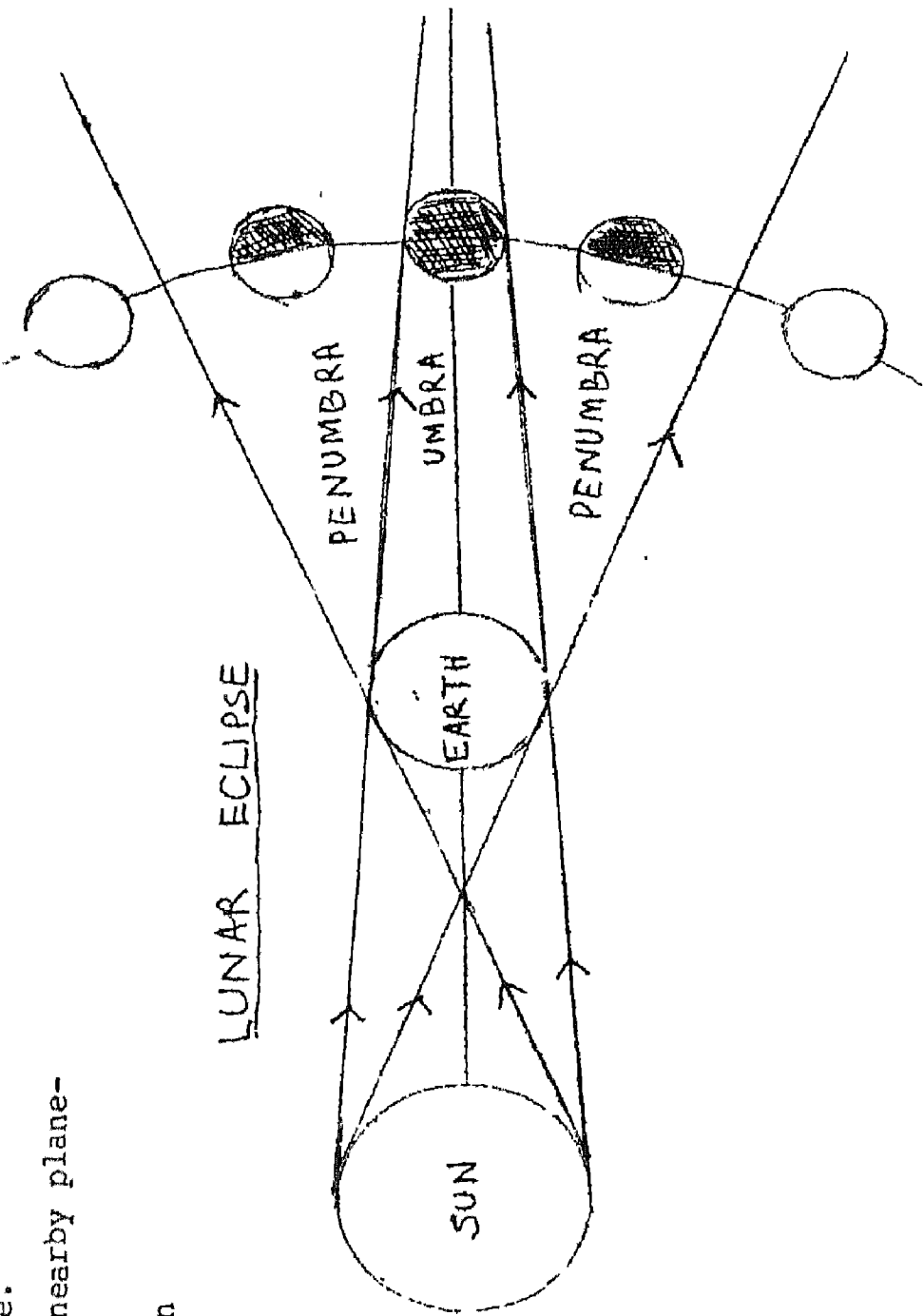
8. Lunar Eclipse

i) Lunar eclipse occurs when the lunar surface is covered by the shadow formed by the earth.	Demonstration of the phenomenon in the classroom as discussed in the textbook (page 6)	Torch light, Foot ball, Small rubber ball, Orary, Candle, Chart showing Lunar eclipse, Dark room.
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ii) Lunar eclipse occurs only on the day of full-moon day (Purnima) when Sun, earth, and moon remain in same plane and in one straight line.

iii) Full lunar eclipse occurs when moon is completely covered by Umbra. Partial lunar eclipse occurs when moon remains partially in Penumbra.

iv) During every fullmoon day the sun, the earth & the moon do not remain in same plane & in same straight line due to which in every fullmoon day (Purnima) lunar eclipse does not occur.



1		2		3		4	
v) We can see the lunar eclipse with the naked eye.		Observation of Lunar eclipse		In the region called umbra, light is completely cut off. But in the penumbra region, some dull lighting will persist. This is because the source of light (the sun here) is not a point but a large object. With point sources, there will be no penumbra.			

9. Solar eclipse

- i) Solar eclipse occurs when the shadow of the moon falls on the surface of the earth.
- ii) Solar eclipse occurs on the day of new moon day only and only when the Sun, the moon and the earth remain in the same plane and in a straight line.

Chart showing solar eclipse, Torch light, Foot ball, Small rubber ball, Orary, ~~Dark room~~

- iii) As moon is comparative much smaller than the earth, the shadow formed by the moon can not cover it in full. The portion of earth which comes under the umbra of the shadow of the moon completely suffers from full solar

Demonstration of the phenomenon in the class room as discussed in the text book (page 7).

Demonstration of solar eclipse in the dark room. Observation of solar eclipse. Visit to Planetarium, Discussion.

1

2

3

4

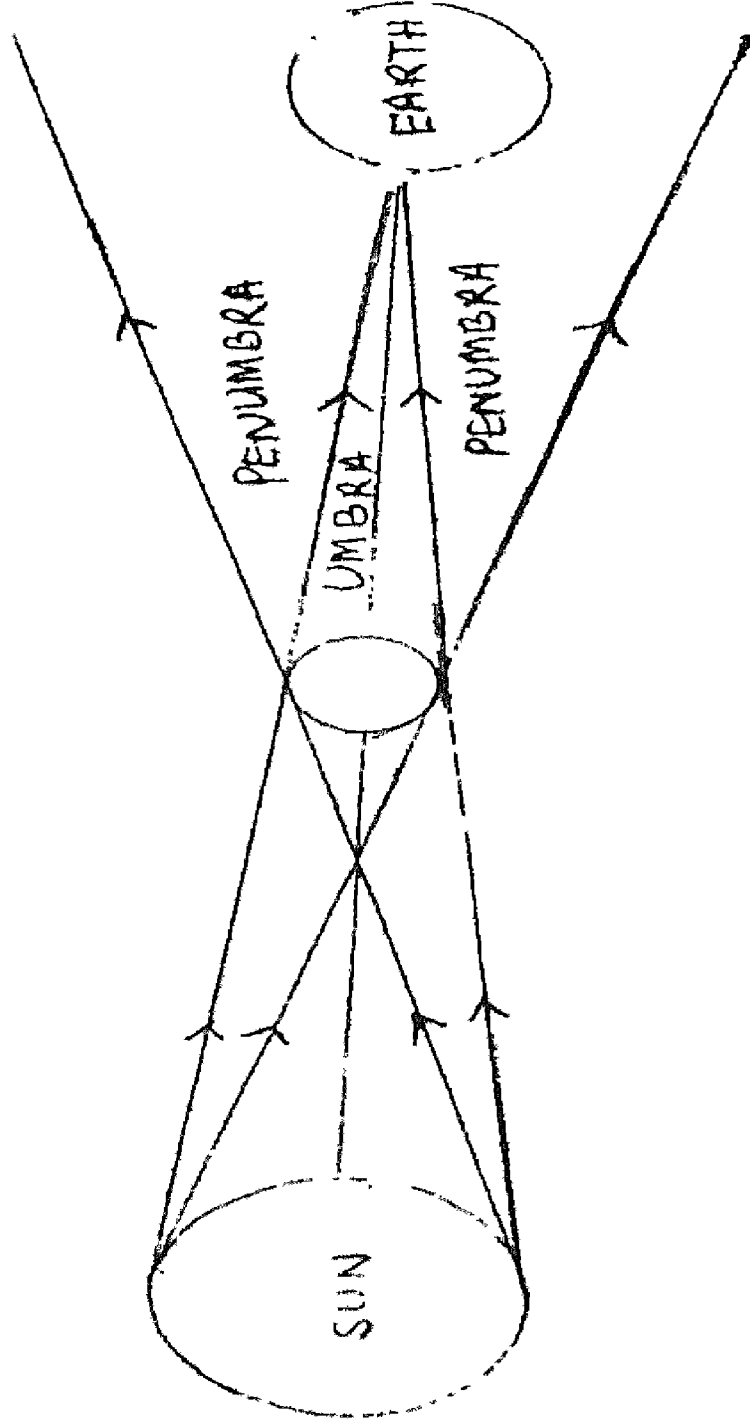
earth which is covered by
penumbra of moon suffers from
partial solar eclipse.

iv) Sometime sun looks like a ring
and this phenomenon is known
as annular solar eclipse..

v) In every new moon day (Amavasya)
the solar eclipse does not occur as
the sun, the moon and the earth
do not remain in one plane &
in one straight line.

vi) We cannot see the solar eclipse
with the naked eye. We can see
through a dark plane glass.

SOLAR ECLIPSE



Suggested evaluation tools for each level of objectives.

Group-A (for minimum level of learning)

1. Answer in one or two sentences.

- a) Name the members of solar system/family ?
- b) Why does moon look so big even though it is much smaller than other planets and stars ?
- c) How do we get light from moon ?
- d) Name two artificial satellites launched to space by India.
- e) How does full lunar eclipse occur ?
- f) How does partial lunar eclipse occur ?
- g) When does the size of our shadow become longest and shortest and why ?
- h) Why was the sun-clock used only during day time ?
- i) Why is the moon considered as dead satellite ?

2. Answer within five or six sentences.

- a) How do we know that the space is too big to conceive ?
- b) Name the planets as per the distance from the sun and indicate the number of satellites possess by each planet.
- c) What do the black spots on the lunar surface indicate ?

Group - B (In general)

1. Match the following selecting suitable aids from Col. 'A' and Col. 'B'.

Column 'A'

Shadow
Newmoon day(Amavasya)
Aryabhat
Jupiter
Saturn
Day & night

Column 'B'

Solar eclipse
Twelve satellites.
Rotation
Revolution
Ten satellites
Weather
Rectilinear propagation of light.

2. Select the correct answer from the following given under each statement.

a) Lunar eclipse occurs only in some fullmoon days (Purnima), because :-

- i) On this day the giant, Rahu, swallows the moon.
- ii) The sun, the earth, and the moon remains in one straight line.
- iii) The shadow of the moon falls on the earth.
- iv) The sun, the earth and the moon lie in one plane and remains in one straight line. (Ans - (iv))

b) The Moon is the satellite of the earth, as

- i) It is much smaller than the earth.
- ii) It revolves around the earth
- iii) It rotates around its own axis
- iv) It is hard and cold. Ans.- (ii)

c) The surface of the moon is not fit for habitation of human being, because :-

- i) there are many deep holes and mountains on the surface of the moon.
- ii) If people will live there they will fall into the space.
- iii) The surface of the earth is covered with thick layer of dust causing a great inconvenience for cultivation.
- iv) There are no hydrosphere and atmosphere on the surface of the moon.

Ans.-(iv)

d) The shadow of a flying aeroplane is not visible on the surface of the earth, because:-

- i) The sun is far away from the earth surface.
- ii) The aeroplane is too smaller in size
- iii) The earth surface is far from the aeroplane.
- iv) The sun shine is too bright

(Ans. -(iii))

3. a) Which one of the following is planet ?

- i) Comet (ii) Moon (iii) Pole star (iv) Great bear
- (v) Morning/evening star.

(Ans. -(v))

b) Which one of the following is used by astronuts to observe the movements of planets and satellites.

- i) Aeroplane, ii) Space craft, iii) Helicopter,
- iv) Rocket

(Ans.-(ii))

4. Which one of the following is right or wrong. ?

- i) Though the moon looks bigger than other celestial bodies in night sky still it is the smallest among all.

Ans.- Right

- ii) The moon has its own light just like the sun.

Ans.- Wrong

- iii) There is no sign of living organism on the surface of the moon.

Ans.-Right

- iv) We can visualise the complete moon as sun light falls on it.

Ans.-Wrong

- v) The moon is in hot and gaseous condition.

Ans.-Wrong

- vi) Your shadow falls towards west in the morning sun.

Ans.-Right

5. Fill up the blanks selecting appropriate from the bracket.

- a) We are able to see the Television programme from Delhi because of _____.
(artificial satellite, natural satellite, planet, star)

- b) Because of the presence of _____ in the air we can clearly see the path of torch light in the darkness .

(Vapour, dust particle, oxygen, carbon dioxide)

- c) _____ country first launched artificial satellite to the space.

(U.S.A., India, USSR, Japan)

- d) When the shadow of the moon falls on the earth we can see _____.

(Lunar eclipse, day and night, change of season, solar eclipse).

- e) Lunar eclipse occurs on the day of _____

(New moon day, full-moon day, on the first day of a fortnight, on the eighth day of a fortnight)

- f) The distance between the moon and the earth is about _____ KM.

(4 lakh, 5 lakh, 6 lakh, 3 lakh)

6. Put a tick (✓) by the side of each answer which you feel suitable.

Artificial satellites are suitable for the following activities for the benefit of mankind.

- a) Wireless communication
- b) Teaching
- c) Weather observation
- d) Space research
- e) War

7. Correct the following without changing the underlined words.

- a) Rakesh Sharma is the first Indian space Scientist.

Ans.-(Astronaut)

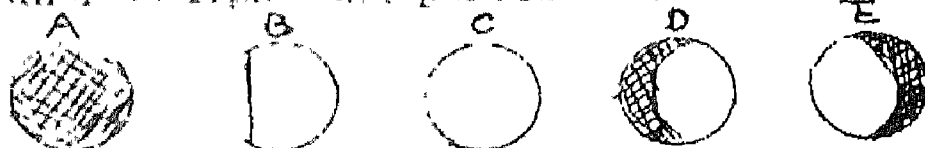
- b) Collins put the first step on the surface of the moon.

Ans.-(Armstrong)

- c) Valentina Tereshkova is the first astronaut in the world.

Ans.-(first lady astronaut)

8. Which of the following figures represent full lunar eclipse and partial lunar eclipse



Ans. A - full lunar eclipse, D&E -Partial lunar eclipse.

9. Indicate the direction of shadow after observation of the following figures.

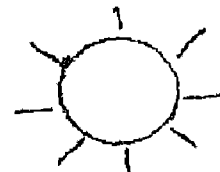
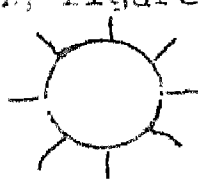
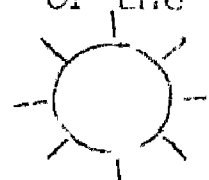
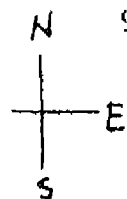


Figure-1

- a) East
- b) West
- c) North
- d) South

Figure-2

- a) Over the head
- b) At the front
- c) At the back
- d) Very close to the foot

Figure-3

- a) East
- b) West
- c) North
- d) South

MODEL LESSON PLAN

Subject :- General Science

Topic :- Artificial Satellites

Unit :- Earth and the sky

Class - V

Teaching aids

Instructional Objectives

- 1) After the instruction is over the students will be able to know that -
 - a) the meaning of satellites and artificial satellites.
 - b) now-a-days artificial satellites are launched to space by the sincere effort of the scientists.
 - c) about the movement of the artificial satellites around the earth.
 - d) the benefit we are able to have because of the artificial satellites

2) Students will be able to understand that -

- a) the launching process of artificial satellites
- b) the process of revolving of satellites around the earth

3) Students will be able to realise the benefit of artificial satellites.

4) _____ to develop the drawing skill

Method of Teaching - Demonstration and discussion

Steps of Teaching - This topic will be taught outside the classroom situation.

- 1) Chart showing the revolution of moon and other artificial satellites.
- 2) Model of an artificial satellite
- 3) An iron rod of 1 metre long.
- 4) Small iron pebbles
- 5) Small rockets
- 6) Match box
- 7) Iron wire having ring at one end
- 8) Video recording of launching a satellite.
- 9) A chart indicating the list of artificial satellites launched by India and other leading countries.

Introduction

Introductory questions

- 1) Which games do you like ?
 - 2) Which game is liked now all over the world ?
 - 3) How do you observe these games sitting at home ?
 - 4) How do you get the life picture through T.V. ?
- Teacher declares - Today we will discuss about this artificial satellites.

(B) Presentation

M a t t e r		Teachers activities	Black board work
Celestial bodies		1) Which is the biggest celestial body in a clear night sky ? 2) How does it look like ? (Circular disc) 3) How many satellites does the earth have ? The solar system chart is to be exhibited. 4) How many planets are there in solar system ? 5) Do other planets have satellites like earth ?	Moon Circular disc One satellite Earth is a planet and moon is it's satellite. Earth has one satellite only
Satellites and its nature.		6) Why do we call them natural satellites ? 7) Around whom the satellites revolve ? 8) What do you see in a clear night sky besides stars, planets and moon ? Students are to be exposed to the model of artificial satellite. These revolve around the earth . The revolution of artificial satellites be demonstrated as described.	Satellites revolve around the respective planets. The artificial satellite moving like moving star they revolve around the earth.

9) Two poles will be fixed on the ground and wncle of fittings would be done as indicated in the figure. The small rocket would be tied tightly tied with the iron pebble and another rocket will be fixed on the ground. The rockets would be ignited. Students will be asked to observe the direction of the two rockets after ignition. This would help the learner to imagine the revolution of artificial satellites around the planet. The direction in which the tied rocket moved and the free rocket moved, The circular path created by the tied rocket helps to streamline the thinking process of the learner.

10) Why does the tied rocket revolve around the earth ?

11) Why does the other rocket moved freely ? The presence of iron wire inbetween the ring and people would be compared with the gravitational force of the planet exerted on satellite. The use of rocket is to be justified properly. The launching of artificial satellite (video tape) to be played to help students observing the process. Soviet Union (USSR) took the lead to launch artificial satellite to space first. By the help of the chart indicating the names of artificial satellites different names of those satellites are to be informed to the learners.

The presence of iron wir (string) help in the revolution of the rocket

Likewise the invisible gravitational force help the planet to keep revolving the satellite around it.

In Oct.4, 1957 Soviet Union launched artificia satellite first to the space.

Please see The Figure in Page. 20

M a t t e r

Teacher's activities

Black board work

12) Why do the countries send the satellites to the space ?

The benefit we get out of it is to be explained to the students.

13) Who is the first astronaut of our country ?

Some satellites have also been sent to other planets to collect information about them.

Wireless communication,
Weather observation, space
research, Distance
teaching and learning
television programmes.
Rakesh Sharma is the
first astronaut from India.
Artificial satellites
have been sent to Mars,
Venus, Jupiter and Saturn.

(C) Comprehension

- 1) Why should we remember the October 4, 1957 ?
- 2) How does an artificial satellite revolve around the planet ?
- 3) How do we get the live T.V. programmes though the occurrence of the event is far away from us ?
- 4) How do we get advance information about the weather ?
- 5) The satellite Aryabhata belongs to which country ?

(D) Summary

- 1) How many natural satellites does the earth has ?
- 2) What is artificial satellite ?
- 3) How are the artificial satellite launched ?
- 4) How do they move in the space ?
- 5) Name the country which launched the first artificial satellite and when ?
- 6) Name four artificial satellites launched by the leading countries.
- 7) Name four artificial satellites launched by India.

Earth has got only one
satellite known as moon.
The satellite which is
man made is known as
artificial satellite. The
artificial satellite is
launched by the help of
rockets to the space.
They revolve around the
earth. Soviet Union is the
first country who launched
artificial satellite first.

M a t t e r s

Teacher's activities

Blackboard work

Appolo series, Soyuz, Explorer, Vostak, Sputnik, are launched by other countries. Arya Bhatta, Bhaskar, Insat-B etc. are launched by India.

8) Who is the first astronaut from India ?

9) Name other planets to which artificial satellites have been launched from the earth ?

10) What are the benefits we get out of artificial satellites ?

The first astronaut from India is Rakesh Sharma. Artificial satellites are also sent to other planets like Venus, Mars, Jupiter & Saturn. The benefit we get out of artificial satellites are - Wireless communication, Weather observation, space research, Distance teaching and learning, Television programmes.

(E) Application

Application question

1) Fill up the blanks selecting suitable words from the brackets.

- a) We can observe the television programmes from Delhi sitting at home because of _____ (artificial satellites, natural satellites, planets, stars).
- b) _____ country launched artificial satellites first. (USA, India, USSR, United Kingdom)
- c) The name of the first artificial satellite launched by India is _____. (Appolo - 11, Bhaskar, Aryabhata, Sputnik)

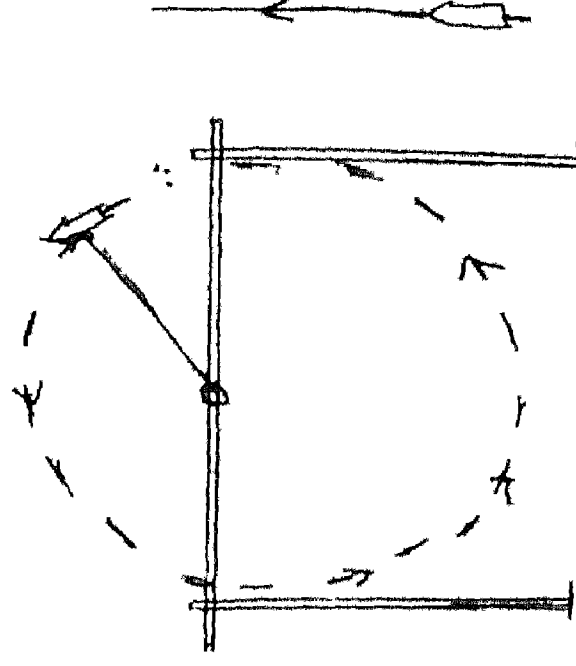
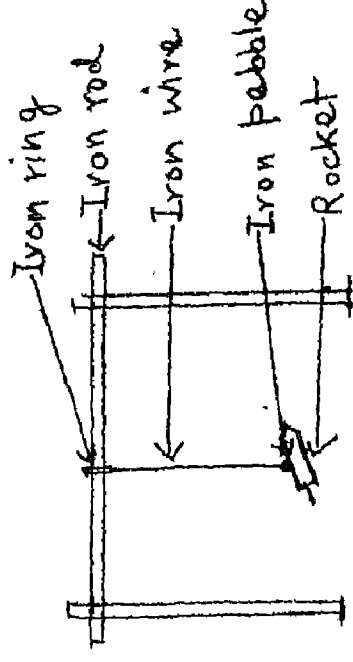
MOTION IN AN ARTIFICIAL SATELLITE

- d) Artificial satellites revolve around the earth because of _____ of the earth.
(Gravitational force, magnetic force, friction, Mechanical force)

- No.2. What are the benefits we enjoy because of artificial satellites ?
- No.3. What is the natural satellite of the earth.

F) Home Assignment

1. Draw a neat labelled diagram of the earth and the moon and indicate the revolution of the moon around earth.
2. Observe the clear night sky and make chart (list) of the celestial bodies you could recognise.
3. Make a list of ten artificial satellites launched to space from the earth.



UNIT - AIR, WATER & WEATHER

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Minor Concept	Suggested teaching strategies	Suggested activities	Suggested teaching Aids
	2	3	4
1. Air exerts pressure	Observation and Experimentation	1) Rubber ball experiment 2) Bottle with two ends open 3) Straw and paper 4) Direction of wind or Tube and any light round seed. 5) When a piece of paper raised upward one of its side bends downward. 1) Glass full of water and a post card experiment.	1) Rubber ball and blade 2) Plastic bottle, balloon water bucket. 3) Own experience 4) Or/Any tube with one closed having a side hole and light round seed or pith ball. Glass full of water and Post Card.
i) Up-ward pressure			
ii) Down-ward pressure		ii (a) Dropper and ink experiment. (b) Syringe experiment	Dropper, Inkpot. Syringe and a pot of water
iii) Pressure in all direction.		iii) (a) Balloon and pot (b) Tin box with cover when heated with a lamp.	Balloon, Pot Tinbox with lamp
2. Composition of air.	Observation and experimentation.		Two
(a) Presence of oxygen.	Observation of nature	a) Belljar and candle Experiment.	Piece of equal size candles and two Bellja. of different sizes.
(b) Presence of Carbon-di-oxide.	Description through their own experience	b, Clear lime water	Clear lime water and empty refill.
(c) Presence of water vapour	Observation.	c) Ice cream or Ice.	Ice cream, Ice and a container.

(d)	Presence of dust particles.	Observation

(e) Presence of Nitrogen Observation

(F) Presence of other gases.

(g) Percentage of constituent components.

3. Every living organism takes oxygen in respiration. Observation from their own experience in respect of human beings and animals.

4. During Photosynthesis plants liberates oxygen

5. Inter dependence of the living organisms plants and animals.

	Observation
6. Pollution of air.	
-	smokes by burning things & petroleum products.
-	dust
-	rotten organic material
-	Chemicals
-	harmful gases

d) (i) Condition of classroom after vacation.

(ii) By observing road side plants.

- (iii) Observation through a beam of light in a dark room.

(iv) Observation by burning a tyre.

e) Burning a candle inside a container with water inside and a graduated Belljar

Pictorial presentation of the use of oxygen cylinder in hospital and carriage of Oxygen pipe in air crafts.

Hydrilla experiment and testing
presence of oxygen.

Pictorial approach

(1) Experience during working at home, village market, and Black Smith Workshop.

(2) Field trip to a nearby town.

Candle, floating material
belljar, match box.

A saline bottle, cream,
match box
container, hydella plant

MAJOR CONCEPT - WATER

1	2	3	4
9. (i) Preparation of solution. - Solvent - Solute - Solution	Experimentation Demonstration -cum- Discussion.	(i) Preparation of solution using local available solute and solvent.	Sugar/salt, water, glass, glass rod
(ii) Separation of solute from the solution. 1. Filtration 2. Decantation 3. Sedimentation 4. Evaporation 5. Distillation 6. Sublimation	Experimentation Demonstration -cum- Discussion.	Clay/Aluminium pot, solution, Lamp Fused electric bulbs glass tube cork, tripped stand made of wire, and match box.	Clay or Aluminium pot, Salt solution Lamp.
(iii) Difference between soluble and insoluble substance.	(i) Observation	(1) Adding salt/sugar with water (2) Adding sand with water (3) Adding carbon with water (4) Adding salt with kerosene	Salt, Sugar, Sand, Water Carbon, Kerosene, Pot
(iv) Separation of insoluble solid, heavy ingredients from the solvent. (v) Separation of insoluble solid, heavy ingredients from the solvent.	(ii) Generalisation about solute, solvent and mixture, and solution. Experimental Demonstration -cum- Discussion. Experimentation Discussion Demonstration.	Sedimentation and decantation. Filtration	Glass, insoluble solid and heavy materials, glass rod. Stand, glass, funnel, filter paper, glass rod.

1	2	3	4
10. Pollution of water	Observation	(i) Open air nature call.	(i) Fieldtrip
- Water pollutants and experience		(ii) Stagnate water in a container, pond, tank of remote area, sanitation of a well in a thickly populated area.	(ii) Use of charts
11. Purification of water.	Experimental Demonstration -cum- Discussion.	(i) By Boiling	Collecting different types of water available in the area.
- Boiling		(ii) By using different types of chemicals like, lime, bleaching powder, carbolic acid, aluminium permanganate, copper sulphate.	
- Chemical treatment		Taste and odour of the boiling water/water from Tubewell/rain/stream/well/tank water.	
- Use of water filters			
12. Nature of Drinking water.	Demonstration Discussion and Observation.		
- Hard & soft water			
13. Water borne diseases		(i) Talk of a health officer in the Institution.	
- Cholera	Demonstration	(ii) Discussion with a patient in a nearby dispensary.	
- Diarrhoea	Discussion		
- Dysentery			
- Eye clues			
- Skin diseases etc.			
14. Precautionary measures to avoid water borne diseases.	Demonstration and Discussion	(i) To develop awareness in food habits, Drinking water and sanitation duty towards the patient ... and eradication of diseases.	

Suggested Evaluation test items

Part:- 'A' (Minimum Level of Learning)

1. Match the following selecting from Col.'B' for Col.'A'.

<u>Col.'A'</u>	<u>Col.'B'</u>
Carbon dioxide	Better drinking water
Low pressure	Air borne diseases
Cholera	Helpful in burning
Oxygen	Turns lime water milky
Influenza	Helpful on floating water
Rain water	Easier to suck by syringe
	Water borne disease.

2. Fill in the blanks selecting the suitable word from the bracket.

- a) _____ is more in the atmosphere of urban area with industrial base .

(Nitrogen, Oxygen, Carbondioxide, Hydrogen)

- b) _____ method is used to make water free from germs.
(Boiling, filtration, sedimentation, decantation)

- c) If _____ is exhausted completely from the atmosphere the burning would not be possible at all.
(Carbondioxide, Hydrogen, Nitrogen, Oxygen)

- d) Plants accept _____ in the process of photosynthesis.
(Oxygen, Carbondioxide, Water vapour, Nitrogen)

3. Give answer of the following in one sentence.

- a) Which method is used by the plants to prepare its own food.
- b) Which method is being adopted while separating sugar from sugar solution.
- c) Which method can be applied to separate floating materials from water.
- d) What should be the nature of drinking water.
- e) What chemicals are being used to make water pure.

4. Answer within two or three sentences

- a) How would you take care of a patient suffering from Cholera ?
- b) Give two examples each in which you experience various works where you feel the types of air pressure. /-different
- c) Why does water from spring and deep covered well useful for our body ?
- d) How does plants and animals are dependant on each other.
- e) What should you do to keep the air of your house clean ?

5. Identify air-borne diseases from the following:-

Small pox, Cholera, Eczema, Dysentery, Measles, Typhoid, Tuberculosis.

6. Give cross mark (X) if the statement is wrong and put right mark (✓) if it is true.

- a) The ventilators are there in the houses to provide passage to light.
- b) Eczema is a water-borne disease.
- c) Phenyle is a disinfectant.
- d) Water comes up inside the tube well because of water pressure.
- e) Plants take oxygen in respiration.
- f) If anything is burnt the amount of oxygen gets increased in the atmosphere.
- g) The air inside a room gets polluted if you sleep inside by closing its doors and windows.
- h) The floating particles from water get separated by the method of decantation.

7. Choose the correct answer from the following under each statement.

a) Ventilators are there in the rooms, because :-

- i) The impure air can enter into the room from outside.
- ii) The impure air from the room can not go out.
- iii) Light can easily enter into the room.
- iv) The impure air of the room can go outside and the pure air from outside can enter into the room.

b) Milk should be boiled properly before we drink, because:-

- i) it gets free from germ.
- ii) it gets digested easily
- iii) It does not help in digestion easily
- iv) non of the above reasons are correct.

c) The water from spring, tube well and deep well are suitable for drinking purpose, because:-

- i) It is tasty and full of germs.
- ii) It is tasty , free from germs and impure.
- iii) It is true, free from germs and full of minerals.
- iv) It is salty and full of germs.

d) The countryside air is having less amount of carbon dioxide and carbon monoxide, because:-

- i) Transportation of vehicles are much less and greenary already is there.
- ii) Transportation of vehicles are too much.
- iii) Industries are in plenty.
- iv) There is not much of plants.

8. Correct the sentences by changing the underlined words:-

- i) If the amount of oxygen gets increased in the atmosphere the food is not digested properly.
- ii) The amount of dust particles are less in urban and industrial areas.
- iii) The solvent and solute can be separated from solution by evaporation.
- iv) The amount of Oxygen is less and carbondioxide is more in the air inhaled.
- v) It starts raining by Condensation of water from river, pond and sea.

Part - 'B' (General)

1. Fill in the blanks :-

- a) Scientist, _____ had discovered air pressure.
- b) The amount of air pressure in every square centimeter area is _____.
- c) When the piston of tube well is moved upward the air pressure inside the tube is _____.
- d) The amount of Nitrogen in the atmosphere is _____ with blood.
- e) The Oxygen gets mixed/in _____ of our body.

2. Give the answer in one sentence:-

- a) How does energy gets liberated in our body ?
- b) Which gas is being utilised by plants in the process of photosynthesis.
- c) Which gas from the industries makes polluted the atmosphere.
- d) Why doesn't Oxygen exhausted from the atmosphere.
- e) Why does the air pressure gets reduced when the piston of a syringe is moved upward.

3. Express in one word only:-

- a) The process by which plants prepare food.
- b) The mixture of solute and solvent.
- c) The process by which water is being heated to form water vapour.
- d) The chemical by which the germs and bacteria are being killed in drinking water.
- e) The process by which salt is separated from salty water to get back salt and water.

4. Fill in the blanks selecting suitable words from the bracket.

- a) The amount of dust particle is more in _____ season. (Summer, Rain, Winter, Spring)
- b) The amount of Oxygen in the atmosphere is _____ (78%, 30%, 20%, 50%).
- c) The level of water rises in the tube well due to _____. (Low pressure of air, Low pressure of water, High pressure of air, all round pressure of air).
- d) _____ gas is more in exhaled air. (Oxygen, Nitrogen, Carbon dioxide, Hydrogen)

-:10:-

LESSON PLAN

UNIT - AIR, WATER & WEATHER

TOPIC:- AIR PRESSURE

CLASS - V

Teaching Aids

Instructional Objectives:- To realise the existence of pressure

- | | |
|---|--|
| 2) To express the mechanism of air pressure in different kinds of work done due to pressure in air. | 1) A plastic bottle having both ends open. |
| 3) To list the utility of air pressure in different machines and plants (systems) exerted by air. | 2) Balloon, |
| 4) To identify the works done due to pressure in different types | 3) Beaker |
| 5) To explain the effect of air pressure in different types of works. exerted by | 4) Inkpot having ink |
| 6) To classify the pressure/force air. | 5) Dropper |
| 7) To distinguish air pressure from water pressure | 6) Syringe |
| 8) To acquaint students with the apparatus used in the experiments. | 7) Glass(tumbler) |
| 9) To place the apparatus in the right place and in right order. | 8) Post card. |
| | 9) Light plastic cup. |

Methodology:- Demonstration-cum-Discussion

Teaching Points:- Air has pressure, Types of pressure:- Downward pressure, upward pressure, pressure in all direction.

Black board work

Teacher's Activities

Introductory questions:- (By showing a ball and allowing a learner to squeeze it) the following questions will be asked.

- What do you feel ? (pressing a bit)
- Again by making a hole in the ball and allowing to squeeze it) What do you feel ? (Easy in pressing)
- What difference do you noticed in the above two situations ?

M a t t e r
(A) INTRODUCTION
Previous knowledge applied.

iv) Why it happened so ? (varied answers) (AIR EXERTS PRESSURE)

(B) Presentation

Air has pressure

1. (Showing a plastic bottle having both ends open)
What is inside the bottle ? (nothing)
2. (Showing a balloon) What is it ? (a balloon)
3. (attaching the balloon on the mouth end of the bottle)
What did I do ? (put the balloon on the mouth of the bottle)
4. (keeping the other open end of the bottle over a beaker full of water) What did I do ? (put on the water in the bucket)
5. (Forcing the bottle to enter into the beaker)
What am I doing ? (pushing the bottle into water)
6. What do you notice in the balloon ? (It is expanding)
7. Why did the balloon expand ? (air is going in)
8. (Showing an ink pot having ink)
What is it ? (ink pot)

9. (Showing a dropper) What is it ? (dropper)

Types of Pressure

1) Downward Pressure

10. What is inside the dropper ? (nothing)

11) (Squeezing the bulging portion of the dropper)
What did you notice inside the ink pot (nothing)

12) (Releasing the bulging side of the dropper inside the ink pot)

What do you find in the dropper ? (ink is there)

Downward air pressure

Ink entered into the dropper.

Ink got into the dropper
as the outside air
exerted downward pressure
on surface of the ink.

13) How did the ink get into the dropper ?

14) (Showing a syringe) What is it ? (Syringe)

15) (Keeping it inside the red ink solution)
What did I do ? (Put in the solution)

16) (Drawing the piston of the syringe backward inside the
ink pot). What am I doing ? (Pulling the piston of the syringe)

17) What do you see inside the syringe ?
(Red ink is filling up in the syringe).

18) How did ink come inside the syringe ?

Upward air pressure

19) (Showing glass and post card to the learners and
taking a glass of water) What do you see ?

the post card / covering glass full

20) (Placing the post card / covering glass full
of water) What did I do ?

21) (Keeping the glass full of water upside down slowly)

What did I do ?

22) What do you see now ? Why is the post card sticking
the mouth of the glass ?

Slowly the glass was
made upside down

Because of upward air
pressure. Air pushed
upward the card on the
mouth of the glass.

23) Why is the water not falling down ?

Upward pressure

1

2

3

24) (Showing a cup and balloon and keeping the balloon in the cup and allowing air to enter inside the balloon) What did I do?

Cup & balloon experiment

25) (Lifting the balloon upwards) What am I doing?

26) What do you observe?

Cup goes up with the balloon.

Pressure in all directions.

27) Why does it happen so?

Air exerts pressure from all direction due to which the balloon got attached to the wall of the cup.

C) Comprehensive Questions:

- 1) In our first experiment why did we take two side opened bottle?
- 2) Why did we take a dropper instead of one end closed plastic tube?
- 3) What difference will you observe in the fourth experiment if you take another glass having half filled with water.
- 4) Why it is easier to carry heavy load on a bicycle?
- 5) What will happen if we go on blowing air inside a balloon?
- 6) What is the function of piston in a lift pump.

(D) Summary Questions

- 1) Explain with an example how does air exert pressure?
- 2) What are the different types of pressure?
- 3) What is downward pressure, give an example to illustrate the pressure?

1

2

3

- 4) What is upward pressure, give an example to illustrate the pressure
- 5) What benefits do we get due to air pressure.

Summary:- A both end open bottle was taken. At one end a balloon was tied. The other end was pushed in a beaker of water slowly. The more it was deeped the balloon got expanded. This indicate that air has pressure due to which the balloon expanded. There are different types of air pressure.

Downward pressure:- Air exerts pressure downward on all objects. Because of this ink gets into the dropper. Upward pressure:- Air exerts pressure upward. The post card does not fall from an inverted glass full of water because of this pressure.

Pressure in all directions:-

Air exerts pressure in all direction. The balloon attached to the wall of the cup.

Benefits due to air pressure

Lifting water by tube well, wind mill, cycle pump, Syringe, ink dropper.

Evaluation Tools

- 1) Fill up the blanks choosing appropriate words from the bracket.

(E) Application

1

2

3

- a) We lift water in the tubewell due to Water pressure, earth pressure, Air pressure, Gravitation
- b) The cover of a glass full of water does not fall down when inverted because of Of air (Upward pressure, downward pressure, sidewise pressure, all side pressure).
- 2) Give ✓ mark for right answer and X mark for wrong answer.
- a) Air comes out from the tube when it is leaked
- b) Liquid medicine enters into the syringe due to water pressure.
- 3) a) What will happen if a hole is made in the straw while drinking cold drinks?
- b) What happens when a hot open tin is closed with lid and cooled?
- 4) Draw a diagram of an experiment to illustrate upward pressure of air.

UNIT:- EARTH, SURFACE AND INTERNAL NATURAL RESOURCES

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LESSON - 3

MAJOR CONCEPT - EARTH SURFACE

Minor Concepts	Suggested Teaching Strategies	Suggested Activities	Suggested Teaching Aids
1	2	3	4
1. Soil	1. Observation and discussion	1. Discussion be made in school garden by showing the soil. Teacher will show different kinds of soil.	1. Different kinds of soil: Dorasa, Matal, Sandy.
2. Layers of soil	2. Discussion and demonstration	2. Teacher will show different layers of the soil by digging a pit. He will show an improvised model of layers of soil. (If possible teacher will show the nearby place where a well is digging).	2. Glass/Polythelene bag filling its lower layer with small pebbles, middle semi hard soil and the upper layer with soft & dust soil. A chart showing the layers.
3. Earth Crust.	3. Discussion and Demonstration	3. By showing an orange skinning out the layers and showing the layers, explain to get different natural resources one has to go 60-70 Kms. deep known as earth crust.	3. Orange and a chart showing the earth crust.

MAJOR CONCEPT - (2) NATURAL RESOURCES

4. Minerals	4. Observation and discussion	4. Showing different kinds of minerals available and differentiate between, non-metal, organic and alkaline materials.	4. Metallic ore, Iron ore Manganese ore, Bauxite Non-metallic ore, Coal, Graphite, Sulphur, Mica, organic Petroleum, Alkaline- limestone & marble
-------------	-------------------------------	--	---

1		2		3		4	
10. Use of Coal		10. Discussion and demonstration		10. Showing different materials prepared from Coal and teacher will explain how coal is used in cooking, Rail engine, industries, extraction of metals.		10. Saccharine, Dyes, Nephthaline, Cooking gas, Phenyle, Coaltar etc.	
11. Petroleum use and availability		11. Discussion and demonstration		11. Showing petroleum products and discussing regarding these products.		11. Kerosene, Diesel, Petrol, Wax, Plastic, Vaseline, Nylon, and rubber, Coal tar.	

MAJOR CONCEPT - (3) FERTILITY OF SOIL

12. <u>Fertilisers</u> (Types of chemical and natural fertilisers)	12. Discussion and demonstration. Experiment and observation.	12. Showing different kinds of chemical fertilisers, teacher will discuss these elements, prepared from different elements like Sodium, Potassium, Calcium, Nitrogen, obtained from different ores. By showing cow dung, compost, green manures-these are natural fertilisers.	12. Urea, Ammonium phosphate, Potassium sulphate, Potassium nitrate. - Cow dung, Compost, Green manure. - Beakers, Spirit lamp, Funnel, Filter paper, Tripod stand, Water, Glass rod, Wire gauze etc.
	<u>Expt:-</u> To show different minerals present in cow-dung, at first take some cow dung and to it add some water & then filter it. Boil that filtered water till the total evaporation of water. You will find some dust particles at the bottom.		
13. Fertility of soil -To increase the fertility of soil.	13. Discussion and Demonstration	13.a) By using different chemical fertilizers for different types of plants. b) By bacteria - showing any pulse plant. c) By deep ploughing (through discussion).	13. Pulse plant.

SUGGESTED EVALUATION TOOL FOR EACH LEVEL OF
OBJECTIVES

Group-A: Minimum Level of Learning

- Q.1. How many layers are there of the soil ? In which layer plants grow ?
- Q.2. How are mineral stones formed ?
- Q.3. Fill in the blanks by choosing the appropriate word from the bracket.
- a) Earth crust is extended from _____ to _____ K.M.
(80,90, 60-70, 20-30, 40-50)
 - b) The stone that is created because of the earth surface being cold is called _____.
(Converted Rock, Volcanic Rock, Metallic rock, mineral ore).
 - c) _____ and _____ are derived from Petroleum.
(Nepthaline, Diesel, Kerosene, Amonia)
- Q.4. Choose the correct answer and write.
- a) Minerals are found _____
 - i) From ocen bed
 - ii) From beneath the earth
 - iii) From mountain
 - iv) From the forest.
 - b) Mineral stones are of various colours because.
 - i) Various colours are mixed with it.
 - ii) Various organic substances are mixed with it.
 - iii) Various metallic elements are mixed with it.
 - iv) Various alkaline materials are mixed with it.
 - c) Non-metallic mineral are -
 - i) Petrol, Kerosine, Diesel
 - ii) Limestone, Chalk, Marble
 - iii) Coal, mica, graphite,
 - iv) Steel, Copper, Manganese.
- Q.5. How coal is formed ?
- Q.6. What materials do we get out of coal?
- Q.7. From the following manures identify natural manure and chemical fertilizer.
- (Green Manure, Potash, Amonia, Phosphorous , Cow dung, Lime, Compost, Sodium, Phosphate)

Q.8. Find out the appropriate word from Column 'A' and match it with the words given at column 'B'.

<u>Column 'A'</u>	<u>Column 'B'</u>
1. Deep Cultivation	a. Growth of plants.
2. Cow dung manure	b. Nitrogen
3. Ammonium Sulphate	c. Potash
4. Pulses	d. Increase in fertility of soil.
	e. Phosphate

Group:- 'B' (General)

Q.9. What is the difference between chemical fertilizer and Natural manure ?

Q.10. Where from do we produce artificial rubber ?

Q.11. Why do earthquakes occur ?

Q.12. How will you prepare compost in your garden ?

Q.13. Why do we use stainless steel instead of still utensils.?

Q.14. Why copper is preferred for the production of electric wire ?

Q.15. What components are used to construct a concrete roof of a building ?

Q.16. What are the uses of coal (give five examples).

Q.17. Why should we be economical in the use of coal and petroleum products ?

Class - V

LESSON PLAN

UNIT:- Earth Surface and Internal Natural Resources.

TOPIC:- Fertilizer and its use.

Instructional Objectives	Teaching Aids
After completion of teaching the topic students will be able :-	
1) to know the meaning of chemical fertilizer and natural manure and its availability.	1) Cow dung, Compost, green manure
2) to know about mineral salts fertility of soil, growth of plant, pulses, bacteria and deep cultivation.	2) Chemical fertilizers like ammonium phosphate, Potassium sulphate, Potassium nitrate.
3) to distinguish between chemical fertilizer and natural manures, fertile soil and infertile soil.	3) Beaker
4) to understand the factors responsible for growth of plant, working principles of bacteria on plant.	4) Funnel and stand
5) to apply the knowledge in increasing the fertility of soil.	5) Spirit lamp
6) to develop attitude for optimum use of fertilizer and utility of deep cultivation.	6) Filter paper
	7) Beaker stand & wire gauze
	8) Water
	9) Pulses
	10) Sapling

Teaching points: (Fertilizer, Chemical Fertilizer, Mineral salt, Fertility of the soil, growth of the plant, pulses, bacteria, deep germination)

Methodology: Demonstration, Observation and discussion

Expected Previous Knowledge:- The students should have some knowledge of how we get minerals, from the earth crust.

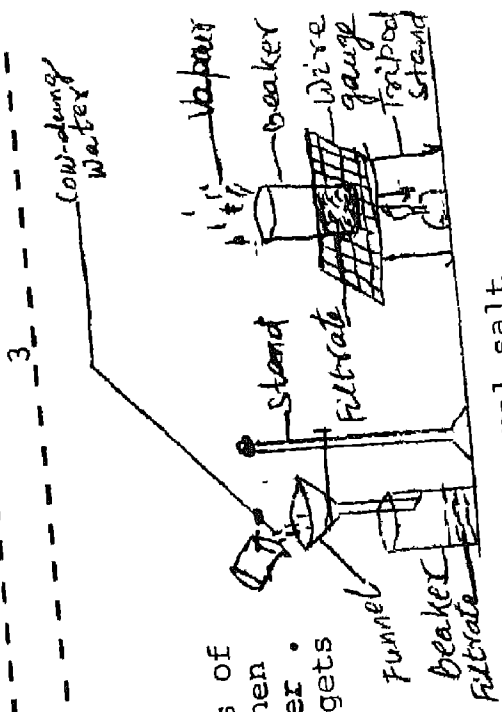
M a t t e r	Teacher's Activities	Black board work
1	2	3

(A) Introduction Introductory Questions:-

- | | |
|--------------------|--|
| Previous knowledge | 1. What does a plant need to survive ? |
| | 2. Except water, air and temperature, what else does a plant need for its growth ? |
| | 3. From which source, we can get these fertilizers ? |
| | 4. How do these fertilizers help, in the growth of the plant ? |

(B) Presentation

- | | | |
|--------------------|---|--|
| Fertilizer | 1. What is required for the best growth of crops ? | Mineral, Fertilizer |
| Mineral Fertilizer | 2. Where from plants get mineral/fertilizer ? | Soil |
| | 3. Showing cowdung, compost and green fertilizer | Cowdung, Compost, Green manure. |
| | 4. In which category of fertilizer can we include these things ? | Natural Manure. |
| | 5. Showing Potassium, Sodium, Calcium, Phosphorus types of fertilizer. | Chemical Fertilizer |
| | 6. In which category of fertilizers we can include these things? From which source we get these ? | Fertilizer is being made artificially from the basic component of mineral ore. Chemical fertilizers are produced by changing the basic elements of mineral ore through chemical process. |
| | 7. Why we call it chemical fertilizer ? | |
| | 8. Except chemical fertilizers why do we use cow dung as fertilizer ? | |



1

To show, there is mineral salt in cow dung an experiment would be conducted.

Experiment:- A little cowdung would be taken in a glass of water and would be thoroughly mixed up. Then it would be filtered through a filter paper. That filtrate is to be heated till water gets completely evaporated.

2

3

9. What do you find in the beaker ?

10. What do you infer from it ?

11. Like this experiment, if you take soil instead of cowdung, what will you get ?

12. What will happen to the soil when you use fertilizer (sulphate) increases

with it ? Use of chemical fertilizer in paddy cultivation.

the growth in the plant particularly in paddy cultivation.

Phosphate is useful for coconut, coffee, orange, sugar cane

etc. Chemical fertilizer (potash) is used for potato and

betelnut.

13. Nitrogenous fertilizers are useful for which type of crops ? Sugarcane, Wheat

Through cultivation of

pulses.

14. Other than chemical fertilizer and natural manure through

what else can we increase fertility of the soil ?

Blackgram, greengram,

lentil.

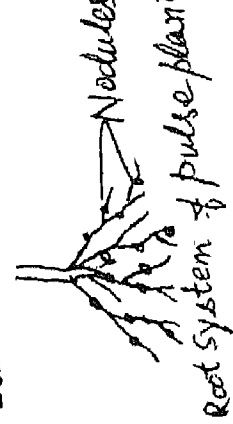
15. Which types of crop come under pulses ?

16. Showing a sampling of pulses, the teacher will ask " How

does it help in increasing fertility of the soil ?

17. What do you find on its roots ?

Pulses



Fertility of soil

Growth of the plant.

1

2

3

18. What is there in the nodules ?

19. How do these bacterias prepare nitrogen ?

Deep Cultivation

20. Except the above mentioned procedure, through what else can we increase fertility of the soil ?

Deep Cultivation

21. How deep cultivation helps in increasing the fertility of the soil.

(c) comprehension

1. Why Potassium, Sodium and Calcium ^{based fertilizers} are called as chemical fertilizer ?

2. Deep cultivation is necessary for India, why ?

3. How does bacteria help in increasing the fertility of the soil ?

4. Why do we use cowdung as fertilizer ?

(D) Summary

Summary

1. Name six chemical fertilizer ?
2. What are the procedures through which fertility of the soil can be increased ?

1. Ammonium Phosphate, Potassium sulphate, Potassium Nitrate, urea, Ammonium sulphate are chemical fertilizers.

2. Fertility of the soil can be increased through deep cultivation, pulses cultivation of pulses and use of chemical fertilisers and natural manures.

1	2	3

3.How do natural manures increase fertility of the soil?

4.How do the pulses plants help in increasing the fertility of soil?

Summary

- 3. There are different kinds of mineral salts in natural manure. These mineral salt acts so as to increase fertility.
- 4. Pulses increases fertility of the soil through nitrogen fixation. Nitrogen is very essential for soil. Bacteria in the root-nodules of pulses helps to exploit nitrogen from the atmosphere.

(E) Application

Evaluative Questions on Acquired knowledge.

Match the following selecting suitable/ from Col. 'A' and Col. 'B'.

words

<u>Col. 'A'</u>	<u>Col. 'B'</u>
Deep cultivation	Paddy
Cowdung manure	Nitrogen
Ammonium sulphate.	Fertility of the soil.
Wheat	Phosphorous

1

2

3

2. Fill up the blanks choosing correct word from the bracket.

(a) _____ and _____ are chemical fertilizers.

(Compost,Urea, Phosphate, green manure)

(b) _____ is essential for the growth of the plant.

(Potassium Nitrate, Ammonium sulphate,Ammonium Nitrate,Ammonium phosphate)

3. Choose the correct answer.

(a) Urea is a

- (i) Phosphorous fertilizer
- (ii) Potash fertilizer
- (iii) Nitrogenous fertilizer

(b) If we cultivate pulses, it

(a) will destroy the fertility of the soil.

(b) will increase the water holding capacity of the soil.

(c) will increase nitrogen in the soil.

(F) Home Assignment:- Prepare two beds of flowering seedling in your garden. Apply natural manure to one bed and chemical fertilizer to another bed. Note the observation for one month and report the result.

Topic:- Force, Work and Energy

Participants:-

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4. Sri Bijay Kumar Dalai,
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Purusottampur, Ganjam.
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LESSON - 4

MAJOR CONCEPTS:- 1) FORCE, WORK AND ENERGY
2) SIMPLE MACHINES AND MECHANICAL ADVANTAGES.

Minor Concepts	Suggested Teaching strategies	Suggested Activities	Suggested Teaching Aids
1	2	3	4
1. Meaning of Force, Work and energy.	1. (a) Demonstration.	1. (a) Lifting of chair and stools by weaker and stronger boys.	1. a) Table, Chair, Stool.
a) Situation in which work is done.	(b) Discussion	(b) Students may undertake some activities called work.	b) Duster
b) Work is done when force is applied.		(c) Students may observe work undertaken in the environment.	c) Brick
c) Force is applied when there is energy			
d) We get energy from food.			
2. To apply minimum force and save energy, we use machines.	2. a) Experiments, Observation & Discussions.	2. a) Students may describe uses of some machines from their experience.	2. a) A broken nail
	b) Discussions.	b) Students may undertake work by hand & then by a simple machine and compare both the situations.	a) A pointed nail c) A hammer d) A knife e) A scissor
3. Simple machines and their uses.	3. a) Demonstration and Discussion	3. a) Students may prepare a long list of simple machines generally used in daily life.	3. a) A scissor b) A knife c) A hammer d) A nail e) A spade f) An axe g) Needle
	b) Discussions	b) Students may be asked to hang a photo with the help of a nail and a hammer.	

- c) They may be asked to bind their school notes with needle and thread.
- d) They may play in See-saw (see-saw)
- e) To sharpen a knife with the help of a stone.
- h) Pick axe
i) Shaw
j) Pulley
k) Iron rod
l) Tongs
m) Blade
n) Wooden cylinder
o) Crow bar
p) Screw
q) Screw driver

4. a) A pulley
b) A bucket
c) Sand/water
d) A stand
e) Rope.

5. a) A stick
b) A big stone & small stone.
c) A scissor
d) A balance
e) Betel nut crusher
f) Tongs
g) Picture of water lifter (see fig).
h) Some pictures showing working of some other levers.

4. a) Students may get water from the well with the help of a pulley.
b) They may fix up a pulley on the bamboo stick to be used for flag hoisting.

5. a) Students may prepare a list of different levers.
b) They may draw diagrams of those levers.
c) They may prepare paper flags with the help of scissor.
d) They may take the weight of any substance.

4. Pulley, a simple machines Observation/ Demonstration/ Discussion.

5. Examples of levers and where they are working.

1	2	3	4
6. Relative position of fulcrum efforts and load and working principles of lever.	Discussion	6. a) Students will draw the diagram of lever and label its different parts. b) Lift a big stone with the help of a lever. c) Open tight cover of a tin with the help of iron.	6. a) As in case of Sl.5 b) Some labelled diagrams of levers.
7. Class I, Class II, and Class III types of levers.	Demonstration, Discussion, Guided study.	7. a) Compare different types of levers in group and classify them. b) Group activity may also be done by students to identify which is lever which is not. c) Group activity also may be done for finding out mechanical advantages/disadvantages in a lever.	7. a) As in case of Sl. No. 6 b) Diagram showing the length of effort arm and load arm. c) A chart showing the different class of levers.
8. Inclined planes are also simple machines	Demonstration, Discussion, Guided study	8. a) Students may be asked to lift individually Bicycle to the verandah with the help of an inclined plane on the steps. b) They may lift a big box in group to a high place with the help of an inclined plane. c) Students may play on the inclined plane in children's park d) They may observe when a Scooter/motor cycle is taken to the verandah through a pucca slope and through an inclined plane on the steps.	8. a) A picture showing lifting of goods to a truck by the help of an inclined plane b) Picture of man taking a scooter to verandah through a pucca slope. c) Picture of a 2-5 men taking a scooter to verandah through a step.

1	2	3	4
9. Wedge is a single machine and also an inclined plane and used in several situations.	Demonstration, Discussion, Self study.	9. a) Prepare a wedge out of bamboo stick. b) Prepare a list of wedges.	9. a) A needle b) A screw c) A screw driver d) A knife e) A blade f) An alpin.
10. Pulleys and two-wheeled cart() and they work like a lever	Demonstration, Discussion, Self study	10. a) Students may draw the diagram of a pulley drawing water from well by a pulley () and two wheeled cart. () b) Students may prepare a model of two wheeled cart () with the help of earthen wheels, card board and thin sticks made out of Bamboo. c) They may handle the pulley while drawing water from well.	10. a) Pulley b) Model of a pulley which helps in drawing water from well. c) Model of a two-wheeled cart d) A picture showing goods are carried through a two wheeled cart e) A picture showing lifting of water from well by a pulley ()

SUGGESTED EVALUATION TOOL FOR EACH LEVEL OF OBJECTIVES

- Part: 'A' Minimum Level of Learning
1. Fill up the gaps choosing appropriate words from the brackets.
- a) _____ is necessary for work (Force, energy)
 - b) Force is produced from _____ (Energy, food)
 - c) Body gets _____ from food. (Energy, force)
 - d) Straight rod is a _____ (Simple machine, Lever)
 - e) Saw is a _____ (Simple machine, lever)
2. There are a number of responses to each of the questions. Choose the correct response by putting a tick mark at the extreme left of the response.
- a) Two boys are asked to lift a big stone. One could do it where other could not, because,
 - i) The first boy was thin and the second boy was fat.
 - ii) The second boy was thin but the first boy was fat.
 - iii) First one was having enough muscular power than the second boy.
 - iv) Second boy did not take his meals for last two days but the first one was taking as usual.
 - v) The first one was tall but the second one was short.
- b) We use machines for different work, because:-
 - i) To complete the work in a short time.
 - ii) To do the work easily with less force.
 - iii) We do not like to labour hard.
 - iv) New type of machines are invented now a day.
 - v) We get pleasure out of it.
- c) To lift very heavy article/goods to the truck, we require -
 - i) More people
 - ii) A long wooden planks.
 - iii) Rope and two bamboo poles.

d) To take cycle/motor cycle, scooter etc. easily to the Varandah of the house-
 i) Wide steps are made ii) Inclined plane/slope is made iii) The height of the varandah is made low. iv) Narrow steps are made.

e) Wedges are -

- i) Simple machines, ii) Inclined plane, iii) Levers,
- iv) Made of bamboo sticks.

f) Wood can be cut well, if -

- i) The axe is made of iron of good quality, ii) The axe is heavy one
- iii) the wedge of the axe is good, iv) The handle of the axe is straight and long.

3. Give a tick mark to the correct response -

- a) We get more energy out of proteinous food. (Yes/No)
- b) We get more energy, if much food is taken always (Yes/No)
- c) Pulley is a lever (T / F)
- d) Perambulator (பெரம்பலேட்டர்) is a machine. (T / F)
- e) Wedge is a simple machine (T/F)
- f) Roof of the thatched house is an example of inclined plane (T/F).
- g) Lever works on application of greater force (Yes/No)

4. a) We can not do each and every work by _____ for this we need the help of the _____.

b) Pulley is a _____

c) Pulley works like a _____

d) scissors is the example of _____.

5) If you are asked to collect grass for your cow, you will require -

i) a knife, ii) A Sickle, iii) Scissors.

b) What is needed for cutting very hard soil -

(i) Spade, (ii) Pick axe, (iii) Axe

c) What is needed for putting a nail on the wall ?

(i) tongs, (ii) hammer, (iii) a screw driver

6. Answer in one/two sentences only.

(a) How can be a work done if we can not apply required force for it ?

(b) Which of the simple machines is required for cutting a tree ?

(c) What is the use of a pick axe ?

(d) Why is there a handle in an axe ?

(e) Why the tip of the nail is sharp ?

(f) What part of the safety pin is an edge ?

(g) Which of the simple machines is used in the lift which carries the labourers of the Coal mines ?

(h) Which is the wedge among the articles/objects/materials used in the game of Cricket ?

7. Give Scientific reasons of the following not exceeding 5 sentences.

(a) Pulleys are fixed in wells.

(b) Fork like shape is at the one end of Certain type of hammer ?

(c) There are threads in screws ?

(d) Coolies carry the goods in a Cart wheel ?

8. a) Give five examples of simple machine.

b) Give five examples of wedge.

c) Give three examples of inclined plane.

9. Find out the levers from the list given below.

Crowbar, spade, scissors, saw, pick axe, bamboo stick,
balance, forceps, screw driver, knife, water lifter,
husking pedal.

10. (a) Draw the diagrams of any three simple machines and write their names.

(b) Draw a picture showing a pulley fixed to a flag post.

(c) Draw the diagram of a wooden hedge.

11. Correct the incorrect statement if any,

a) An iron rod is not a lever.

b) Safety pin and Needle are same type of wedge.

c) Pulley is a lever

d) Steps of a puuca building are inclined planes.

12. Match the words of Column 'A' to appropriate words of Column 'B'.

Column 'A'

Children's playing
slope. and pulley
Forcep
Tip of the Alpin
Wooden plank

Column 'B'

Lever
Inclined plane
Wedge
Simple machine

Part:- 'B' General

5. Identify the class of levers from the following:
 Scissors, Crowbar, Force, Balance,
 Betelnut crusher (අලු කළි) Water
 lifter (සෙදු), Husking Pedal (සිසි)
 two-wheeled cart (සරණ රථ),
 pair of tongs (අල්ලු)
 a) Which are the 1st class levers
 in the above list ?
 b) Which are second class levers
 in the above list.
 c) Identify the 3rd class lever
 in the list.

1. a) What is load ?

b) What is effort ?

c) What is fulcrum ?

2. Complete the sentences.

a) Arm in between fulcrum and Load

is _____.

b) Arm in between fulcrum and effort

is _____.

3. Match the words of Column A with appropriate words of column B.

Column 'A'

Head of husking pedal

Tail of husking pedal

Lever of husking pedal

Mid-point of husking pedal arm

Column 'B'

Effort

Fulcrum

Load

4. Draw the diagram of a scissors and point out, fulcrum, load and effort.

LESSON PLAN

UNIT:- FORCE, WORK AND ENERGY

TOPIC:- SIMPLE MACHINES AND THEIR USES

CLASS - V

Instructional Objectives	Teaching Aids
After teaching the topic the students will be able - 1. to know different simple machines like spade, sickle, hammer, nails, needle, axe, scissor, pulley etc. and their uses. 2. to comprehend the scientific process and principles by operating simple machines, such as - how they help to do the work easily with less use of force. 3. to apply the knowledge acquired in new situations and daily life. 4. to develop skill in drawing diagrams of different simple machines. 5. <u>in conducting certain activities with the help of simple machines, like lifting heavy bodies, preparing model of cart wheel, model of pulley etc.</u> 6. to develop attitude for optimum use of these simple machines.	1) Nail 2) Hammer 3) Axe 4) Knife 5) Iron rod 6) Bamboo pole 7) Spade 8) Forceps 9) Needle 10) Pulley 11) Scissor 12) Sickle 13) Picture showing lifting water from well. (see)
<u>Methodology:-</u> Demonstration, observation and discussion .	
<u>Teaching points:-</u> Work, force, energy, simple machine, fixing up a nail, use of simple machines.	

M a t t e r	Teacher's Activities	Blackboard work
1	2	3
(A) <u>Introduction</u>		
Previous knowledge	<ol style="list-style-type: none">1. How do we pull water from well ?2. Which part of our body involved too much in pulling.?3. When it is not possible to do certain work by hand, What do we need to do the work ?4. What do you mean by machine ?5. Any thing/object which helps us in doing the work, What do we call it ?6. What do we gain by doing the work with the help of those machines ?	Simple machines and their uses.
(B) <u>Presentation</u>		
Work, Force, and Energy.	<ol style="list-style-type: none">1. What do you mean by work2. What do we apply to do a work ?3. Who supplies the force ?4. Where from energy comes to our body ?5. What do you mean by machine ?6. If our force is less to do a certain work like lifting up a big stone or putting a nail on the wall by hand, what do we generally do-?	<p>We apply force.</p> <p>Energy supplies force</p> <p>We get energy from food</p> <p>We Take the help of machine.</p>
Simple Machine		

2

1

Fixing up a nail

(A student may be asked to fix up a nail on a wooden plate by hand, failing, with the help of a hammer)

7. What did you observe ?

8. How did the hammer help ?

9. Tell the names of some simple machines of this kind, which are generally used in our day-today work.

10. For cutting earth what is required ?

11. For cutting wood what is needed ?

12. For cutting paper what is required ?

13. For stitching our cloths what is necessary ?

(These are simple machines)

14. What is needed to dig hole on the earth ?

15. What is needed to fix up a nail on the wall ?

16. (Teacher demonstrates the cutting paper with the help of knife)

Use of knife and
Scissors for cutting
papers.

How do you cut the things easily ?

17. (Cutting with the help of a scissors)

How do you cut here ?

18. What is this ?

3

To put the nail on the wall we take the help of a hammer.

Scissors, needle, axe,
knife, spade, pick axe,
sickle, shaw, tongs, forcep,
iron rod etc.

Spade

Axe

Knife

Needle

Crow bar

Hammer

With the help of a knife.

Cutting more easily

Scissors

1

2

3

19. As these are helping us in our work,
What will we call them ?

Simple Machines

20. From the above experiments what did you know ?

Experiment:- To lift a
nail fixed on a wooden
plate.

21. When less force is used, what is saved ?

(Teacher will ask a student to lift the nail from the
wooden plate by hand, then by a specific hammer when
failed.)

The work which can not
be done by hand, can be done
by the help of machine
easily with less force.

Energy is saved.

22. What did you see when the boy was asked to lift
the nail by hand ?

He could not do by hand.

23. What happened when the tool is applied ?

Experiment:- To show how a
heavy box can be taken
easily from one place
to another.

It was done easily.

Showing a heavy box or an unit of 50 Kg. weight and
asking them to take from one place to another.

Students will try one by one
and failed.

24. What do you see ?

No body could do .

(Then teacher will give two rounded wooden sticks and
place them under the box and ask the students to apply
force to transfer the box from one place to another)

Student could do it easily.

25. What do you observe now ?

The box was taken by keeping
these two wooden sticks
under it.

26. Who made our work easier and simple ?

Those two wooden sticks.
Simple machine.

27. What will we call them ?

1

Experiment:-Lifting up water with the help of pulley.

(A Pulley may be shown to the students)

28. What is this ?

Yes it is a round structure made of iron.
(Showing how does it rotate).

29. What do you see ?

It is rotating. It is called pulley.

30. (Showing the picture)what do you see in the picture ?

31. What is there on the well ?

(Demonstrating the use of pulley with the help of a wooden stand to lift a bucket of sand in the classroom, if there is no science room).

Experiment:- To show lifting up a bucket of sand from the ground with the help of a wooden stand and a pulley.

32. What did you feel when you are lifting up the bucket full of sands ?

33. What do you feel when you are lifting the bucket with the help of a pulley ?

34. Which made our work easier here ?

35. Then what is a pulley ?

2

3

This is round structure.

It is rotating

A girl is lifting water from the well.

A wooden stand with a pulley fixed on it.
Student will handle the experiment individually

It was heavier.

It become lighter and was easy to lift.

Pulley

Pulley is a simple machine.

1

2

3

(C) Comprehension

1. Why do we take the help of machine for doing different work ?
2. Why the tip of the nail is sharp and pointed ?
3. Why do people use pulley in lifting water from the well ?
4. Why the coolies at the Railway station use (coolies) cart wheel for carrying goods from one place to another ?
5. How can a heavy stone transferred from one place to another ?

(D) Summary

Summary

1. Which is the source of force for doing a work ?

"Simple machines and their uses".

2. Which is the source of energy in our body ?

Force applied for doing a work from energy. Energy is produced from food in our body.

3. As we can not do all the work by hand, what do we need and what advantages we get ?

As we can not do all work by hand, we take the help of simple machines and by this work is done easily with less force.

4. Name some simple Machines.

Simple machines are: Spade, Crow bar, knife, Axe, Needle, Bamboo pole, Scissors etc are the examples of simple machines.

5. What is pulley ?

Pulley is also a simple machine. It is used in lifting heavy weight and water from the well.

6. What is its use ?

1

(E) Application

No.1. Give a tick mark (✓) to the correct responses written in the bracket.

- (a) We get more energy out of proteinous food. (Yes/No)
- (b) We get more energy, if much food is taken always. (Yes/No)
- (c) Pulley is not a machine (Yes/no)
- (d) _____ is need for binding a note book. (Knife, Needle, Scissor)
- (e) _____ is needed for cutting very hard soil. (Spade, Pick axe, Axe)
- (f) _____ is needed to collect grass for cows. (Knife, Sickle, Scissors)

No.2 Match the words of Column 'A' to the appropriate words of Column 'B'.

Column 'A'	Column 'B'
Spade	To replace a big stone.
Crow bar	To cut paper
Pulley	To cut wood
Knife	To cut soil
Axe	To lift heavy weight.
	To fix up a nail in the wall.

(F) Home Assignment

- 1. Prepare a list of five simple machines, those are in use in your surrounding. Describe how you get mechanical advantage out of those.

Group - 5

MODULE -5

UNIT:- Properties of matter

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Minor Concept	Suggested Teaching strategies	Suggested activities	Suggested Teaching aids
1.Types of Matter Solid,Liquid	Observation,Demon-	Students will be	

Minor Concept	Suggested Teaching Strategies	Suggested activities	Suggested Teaching aids
1. Types of Matter Solid, Liquid and gas.	Observation Demonstration Discussion Experience of the learners in real life situation.	Students will be asked to collect pieces of wood, small stones, iron pieces, water, pieces of coal, oil etc. and by this the idea of solid and liquid can be imparted. They will be asked to observe a burning Agarvati and a burning Kerosene flame. The smoke coming out of it will give them idea about gas. They may be asked to bring an amount of air, for example a stoppered empty bottle.	Pieces of wood, stone, brick, glass, water, oil, kerosene, Agarvati, Keros lamp. Match box, Empty bottle with stopper.
Weight of Matter a) Solid		a) Pieces of stones, bricks or any other solid matter will be given to some of the students. They will express their feeling by keeping the matter on their palm. Comparatively a bigger matter will be put on their palms and their feelings are to be noted. By this they can have the idea about the principle that in the case of a given substance the bigger in size the heavier in weight. A bigger stone is difficult to be shifted but a smaller stone easier to be lifted.	Stones of different sizes
b) Liquid		b) An empty glass and an identical glass full of water will be given in the hands of some students at the same time. Their feelings regarding their relative heaviness are to be noted.	Two glasses of same size and water.

-----1-----2-----3-----4-----

c) Gas -

It has no definite volume ;
It takes the shape of the enclosed area where it is kept. It is closed in an enclosed chamber.

It is to be explained from the daily life

experience such as, kitchen is getting filled by smoke, smoke gets spread in the air through chimneys of the factories.

5. Process of measuring Volume:-

a) Solid (having regular sizes)

Demonstration,
Discussion

Measurement of the volume of a cube having length 1 cm, breadth 1 cm, height 1 cm, Block of ludo, blocks of different sizes will be brought and the measurement of all sides will be taken.

Measurement of volume of a rectangular block

having length, breadth and height of different magnitude. A block of brick and rectangular blocks of different sizes will be brought to classroom

and by the help of students the magnitude of length breadth and height will be measured by multiplying magnitude of all the three in both the cases (cubes and rectangular solids) the volume of the solid objects will be calculated.

Ludo, blocks of different sizes of cubes.

Brick, rectangular blocks of different sizes.

1	2	3	4
<p>b) Liquid</p> <p>1000 cubic centimeter (cc) = 1 litre</p> <p>1 cc = 1ml</p>			
		<p>In a hollow ludu cube if water will be taken the volume of water will be equals to 1 cc. What would be the volume of water if we double the amount of water ? Likewise we can put 1 cc, 2 cc, 3 cc, 4 cc, 5 cc, 6 cc of water in a narrow cylindrical glass and a measuring glass can be prepared. In this manner the idea of 100 cc, 500 cc and 1000 cc will be given to the students and then 100 cc = 100 ml $\frac{1}{10}$ litre, 500 cc = 500 ml = 1/2 litre and 1000 cc = 1000 ml = 1 litre relations will be shown. Students will be asked to measure the volume of liquid by the help of measuring glass.</p>	<p>Hollow ludu cube, water Measuring glass.</p>
<p>c) Solid (having irregular sizes)</p>		<p>In a measuring glass some amount of water will be taken, a small stone having irregular size will be selected such that it can be completely dipped in water inside the measuring glass. The stone will be tied with a fine thread and it will be dipped in the water. Now, students will be asked to observe the rise of the level of water inside the measuring the glass. Another measuring glass will be completely filled with water and the stone will be immersed in it. Some amount of water will be over flown. How do the two occurrences happen ?</p>	<p>Plate, glass, two measuring glasses, thread, small stone.</p>

1	2	3	4
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Now students will be asked to measure the volume of some other irregular objects by the help of measuring glass (water displacement method).

Glass, water, thread, two small stones of different sizes.

Stones of two distinct different sizes will be taken and tied with the threads. They will be dipped in a partially filled in glass of water at different times and the size in the level of water will be marked by ink on the outer surface of the glass. The difference between the two levels will be measured by the help of a scale. The glass will be filled with water such that water without over flow from the glass at the time of immersing the stones at different times which stone is having more volume ? (bigger/smaller)

A complete brick
A wooden block of same size.
Physical balance.

One full size brick and a wooden block of exactly same size will be shown to the students. What relationship with regard to volume is there between the two objects ? That the volume of two objects is same is first shown by measuring the length, breadth and height. One student is to be asked to feel about the weight of the two objects by keeping them in his hands. His feeling is to be noted. Then the two objects will be weighed by the

6. Volume of bigger objects and smaller objects made up of some materials.

Observation
Demonstration
Discussion

7. Two objects (solid) having same volume can differ in their weights.

Observation,
Demonstration

1	2	3	4
		help of physical balance and the difference is to be shown to the students.	
b) Same volume of different liquids differ in weight.	Observation Demonstration	Two identical measuring glasses will be taken. In one measuring glass 15 ml of water and in another measuring glass 15 ml. of Kerosene to be taken & weighed in physical balance. The difference in weight of the two liquids are to be derived from the students.	Two identical measuring glasses, Physical balance, a beaker of water, a beaker of kerosene.
8.a) The solid of same weight can differ in volume.		Rice and parched paddy (khai) of same weight will be taken by the help of a physical balance. The volume of those two will be measured by the help of a measuring pot. The difference in volume is to be noted by the students.	Rice, parched paddy, Physical balance, Measuring pot.
b) The liquids of same weight differ in volume.		A beaker of water and a beaker of kerosene are to be taken. Two beakers of the same weight are to be kept in two sides of a physical balance. In one beaker some amount of water to be taken. Now in second beaker kerosene is to be poured till the weight of kerosene equals with that of water. Now the liquids can be measured by volume by the help of two measuring glasses and the difference in volume can be noted by the students.	Kerosene, water, Physical balance, Two measuring glasses. Two beakers of same weight and volume.

1	2	3	4
---	---	---	---

9. Relative Density Demonstration "Relative density of a substance is the ratio of its density to the density of water". Comparison of the density of water with that of an object. Equal volume of water and the object is to be taken and 'how many' times heavier is the object than the water, is to be determined . The above mentioned number is the relative density of the object.

(i) One ml. of water and mercury are to be taken. Water, Mercury,
Then weight of 1 ml of water is to be determined. Measuring glass,
The comparison of weight of 1 ml. mercury and Physical balance.
weight of 1 ml. water will indicate the relative
density of mercury.

(ii) In a plate a beakerful of water is to be taken. Water, beaker, plate,
An iron piece is tied with a thread and dipped physical balance,
into the beakerful of water. The displaced water measuring weights,
is to be collected in the plate. The weight of a piece of iron.
displaced water and the iron piece are determined.
The comparison of the two weights indicates
the relative density of iron. Likewise the
relative density of heavier metals than water
such as Aluminium, copper, gold, silver is to be
informed to the students.

Suggested Evaluation Tools for each level
of Activities

Part - A (Minimum Level of Learning)

1. Identify the states of the following matters:

<u>Name of the matter</u>	<u>State of the matter</u>
a) Chalk
b) Duster
c) Petrol
d) Ice
e) Air
f) Carbon dioxide
g) Smoke from the chimney of a factory
h) Spirit

2. Correct the sentence without changing the underlined words in the given sentences.

- a) Smoke of Agarbat is liquid.
- b) Mercury is solid
- c) Castor oil is gas
- d) Oxygen is solid
- e) Salt is liquid

3. Indicate from the following which has got weight mercury, oil, light, ice, electricity, thread, smoke.

4. Select the correct answer from the following.

- a) What happens when we add sugar to water:-
 - i) The weight of sweet water remains unchanged.
 - ii) The weight of sweet water gets reduced.
 - iii) The weight of sweet water gets increased.
- b) What happens when a glass pebble is dipped in glass full of water.
 - i) It displaces water of its own weight.
 - ii) The level of water remains unchanged.
 - iii) It displaces water of its own volume
- c) What happens when equal volumes of wood and iron are weighed.
 - i) both are having equal weight
 - ii) Iron is heavier than wood
 - iii) wood is heavier than iron

- d) What happens when equal volumes of water and oil weighed.
- i) Both oil and water would be equal in weight.
 - ii) Water would be heavier than oil.
 - iii) Oil would be heavier than water.
- e) What happens when equal weight of paddy and fried paddy are measured by volume -
- i) The volume of both would be equal
 - ii) The volume of paddy would be more
 - iii) The volume of fried paddy would be more

5. Give the reasons of the following :-

- i) The clever crow could get water even though the level of water in the earthen pitcher was low.
- ii) When we try to take water by dipping a glass in bucket full water, water gets overflowed.
- iii) When a pitcher is being dipped in a tank we hear a particular type of sound from it.

6. Fill the blanks:

- a) Length X breadth X _____ = Volume
- b) The volume of liquid is being expressed in _____ units.
- c) The unit of the volume of solid is _____.

7. Select the correct answer out of the options provided -

- a) Ice floats on water, because
 - i) Ice is the solid form of water.
 - ii) Ice is colder than water
 - iii) The relative density of ice is more than water.
 - iv) The relative density of water is more than ice.
- b) Iron sinks in water but floats on Mercury, because -
 - i) Mercury is thicker than water
 - ii) Mercury is metal and water is non-metal.
 - iii) The relative density of water is more than mercury.
 - iv) The relative density of mercury is more than water.

8. Fill in the blank selecting a suitable word from the bracket.

The _____ of the substance is the ratio of its weight to the weight of equal volume of water.

(Volume, density, relative density, weight)

Part-B (General test items)

1. What change do you observe ? When the torch light is put in a glass full of water.
 - a) The level of water comes up.
 - b) The level of water remains unchanged.
 - c) The level of water goes down.
2. Write the answer in three or four sentences. The smoke from the oven spreads all over the kitchen.
3. Select the correct answer:-
The weight of 1000 cubic centimeter (c.c.) of water
 - a) 1 gram
 - b) 1 Kilogram (Kg.)
 - c) 1 Litre
 - d) 1 Mililitre (ml.)
4. What change would take place. If,
 - a) dried gram seeds are soaked in water.
 - b) ink is exhausted from the pen
 - c) a cycle tube is punctured .
5. Which one is heavier between -
 - a) A glass of water and a glass of juice.
 - b) A Tea-poy and a table made up of sal wood.
 - c) Two poles of equal volume made up of wood and iron.
 - d) Two pitchers made up of earth (mud) and metal.
6. Find the volume of a chalk box having length of 15 cm., breadth, 10 cm. and height 5 cm.
7. Correct the following without changing the words underlined.
 - a) The volume of two equal weight of liquids are same.
 - b) The mass of two equal volume of liquids are not same.
8. Iron sinks in water but floats in mercury.
Give the scientific reasons of it in one sentence.

-:12:-

MODEL LESSON PLAN

UNIT - MATTER AND ITS PROPERTIES CLASS - V Topic:-Properties of liquid.

Teaching aids

Instructional Objectives:-

After the completion of teaching, students will be able -

1. To know that equal volumes of two liquids will differ in their weights, liquids of equal weight differ in their volume.
2. Oil floats on water and mercury sinks in water.
3. To understand the reasons of the above mentioned phenomena.
4. To apply the knowledgeⁱⁿ the real life situations.

Teaching points:- Equal volume of liquids differ in their weights, Mercury is available in liquid form, mercury is heavier than water. Liquids of equal weights differ in their volumes, oil floats in water. Mercury sinks in water.

Method of Teaching:- Observation, demonstration and discussion.

Introduction:- 1) What are the various states of matter ? (Solid, liquid, gas)

(Showing two blocks of iron and wood having same volume)

2) Which one of the two is heavier ? (Iron) Block

Suppose you have one Kg. of iron and one Kg. of cotton

3) Which one will have more volume (cotton)

If you fill a glass with water

4) Whose space will be occupied by water ? (air)
Now the space occupied by water is called the volume of water.

Water, two measuring glasses, physical balance, mercury, kerosene oil, coconut oil, Beaker.

M a t t e r

Teacher's activities

2

1. Equal volume of liquids differ in their weight.

Black Board Work

3

A physical balance would be shown to the students, two measuring glasses having equal weights would be put in two pans of the physical balance.

1. What do you observe now ? (The weight of two measuring glasses are same)

Two students would be given the two measuring glasses and one would be asked to pour 10 cc water into the glass (1st) and the other would be asked to pour 10 cc of kerosene oil to his glass (2 nd)

.Showing the glass containing water to the students.

2. What is the volume of water in the first container ?

Showing the second one ?

3. What is the volume of kerosene oil in the second container ?

4. What is the relationship in between the volumes of two liquids.

5. What do you understand now ?

Now the two measuring glasses would be weighed with the help of balance.

6. Which glass weighs more ?

7. Which glass weighs less ?

8. What inference could you take from this phenomenon.

The volumes are equal. The volumes of water and kerosene are equal.

Water is heavier than kerosene oil even though volumes are equal.

1		2		3	
2. Mercury is in liquid state. Showing some amount of mercury in a measuring glass.		9) What do you observe ?		Mercury is available in the state of liquid.	
10) In which state mercury is available ?		One student will be asked to take 1 cc. of water in one measuring glass. Teacher would take 1 cc. of mercury in another measuring glass.		The volume of water and mercury are equal.	
11) What relation do you observe with regard to volume of these two liquids ?		The two measuring glasses would be weighed by the help of the balance.		Even though the volumes are same they differ in weight.	
12) Which glass is heavier		13) Which glass is lighter		Pour more water to the measuring glass having water.	
14) What was the volume of two liquids ?		15) What do you infer from this ?			
"Even if the two liquids are having equal volume still they differ in their weight".					
16) If you want to equal the weight of water with that of mercury what would you have to do ?		The required amount of water would be poured into the measuring glass having water to make the weight of water equal with that of mercury.			
17) What do you observe now ?		One student would be asked to read the measure of water level in the measuring glass.			
4. Liquids of equal weight differ in volume.					

1

2

3

18) What is the volume of water now ?

Little more than 13 c.c

19) What is the volume of mercury ?

1 c.c.

20) What difference do you observe now ?

Volume of water is more than volume of Mercury

21) What do you infer now ?

" Equal weight of different liquids occupies different volumes" Even if the weight is equal still ~~the volume~~ differs.

5. Oil floats in water.

In a beaker some amount of kerosene oil would be taken.

A student would be asked to pour water in the same beaker.

22) What do you observe now ?

23) Initially where was the Kerosene oil ?

Kerosene oil was at the bottom. Kerosene oil is at the top now. Kerosene oil is lighter than water.

24) Where is Kerosene oil now ?

25) Why does the kerosene oil float on water ?

In another beaker some amount of water would be taken. Little coconut oil would be poured into the same beaker.

26) What do you observe now ?

Oil is lighter than water Hence oil floats on water

27) Why does oil floats on water ?

In a beaker some amount of water would be taken.

A little mercury would be put into the beaker of water.

28) What happened now ?

Mercury sinks in water. Mercury is heavier than water.

29) Why does mercury sink in water ?

6. Mercury sinks in water.

Comprehensive question

- 1) At the time of weighing equal volume of water and kerosene why does same type of measuring glass taken ?

1

2

3

- 2) Why does castor oil float on water ?
- 3) Why does the measuring glass used when the volume of liquid is measured ?
- 4) To make the weight of water equal with that of 1 c.c. of mercury why does a little more than 13 c.c. of water needed ?
- 5) Why does mercury sink in water ?

Summary questions

- 1) Even if the volumes of different liquids are equal still why does the weights of the liquids differ ?
- 2) How can you know that even if the weights of different liquids are equal still the volumes differ ?

When equal volume of kerosene oil and water weighed the weight of water became more. The weight of kerosene oil is less. Likewise, the weights of equal volume of mercury and water differ. Mercury is heavier than water. Hence it is concluded that **even** if the volumes of different liquids are equal the weights differ. When 1 c.c. of mercury is taken and equal weight of water is taken, the volume of water would be little more than 13 c.c. Hence it can be inferred that even if the weights of different liquids are equal still the volumes differ.

Oil is lighter than water, hence oil floats on it. Mercury is heavier than water, hence it sinks in it.

- 3) Oil floats on water but why does mercury sink ?

1

2

3

Application question

1. Select the correct answer for the statement from the following options.

Between equal volumes of water and oil -

- a) the weight of water and oil would be equal.
- b) the weight of water would be less.
- c) the weight of water and oil would be unequal.

2. Correct the following without changing the underlined words.

- a) Equal weight of two liquids will be having equal volumes.

- b) Equal volume of different liquids will have unequal weight.

3. Give the scientific reason -

- a) Iron sinks in water but oil floats on it.
- b) Iron sinks in water but floats on mercury

Topic :- LIVING WORLD: ANIMAL KINGDOM & PLANT KINGDOM

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MAJOR CONCEPT - LIVING WORLD (ANIMAL KINGDOM AND PLANT KINGDOM)

Minor Concepts	Suggested Teaching strategies	Suggested Activities	Suggested Teaching Aids
1	2	3	4

(I) CELL AND PROTOPLASM

- (i) Plants and animals are made up of the basic unit, the cell which contains protoplasm, the physical basis of life.
- (ii) Non living beings don't have such cells.
- (i) Observation of plants, animals and non-living objects at different place in the locality.
- (ii) Observation of the arrangement of bricks in a newly constructed building to understand the (the basic unit) arrangement of cells.
- 1) Samples and charts to be taken to the classroom.
- 2) Students are to be taken to the Wooden blocks, brick/ nearer newly constructed building.
- 3) Drawing of Cell structure on the black board.
- Stone, Chair
- Coloured chalks, Pointer, Duster, B.B.Cloth.

iii) Demonstration of daigram of a Cell.

(II) RESPIRATION

- i) All living being respire. Respiration is the sign of life.
- ii) Non living objects do not respire.
- i) Observation/feeling of the contraction and expansion of own chest & as well as other animals.
- ii) Observation of inspiration & expretion of own and some other animals.
- 1) Showing of contraction and expansion through baloon, bladder.
- 2) Demonstration expiraton and inspiration by placing piece of paper infront of nose.
- 3) Demonstrating the respiration of some domestic animals.
- Baloon, Bladder, piece of long slender paper.
- Fish

Dogs, Pups, Chick

Plants available in the school garden.

Stone.

- 1) Demonstrating Pups and dogs outside the classroom.
- 2) Demonstrating some plants of different height & different students of the class.
- 3) Observation of sample of a stone on subsequent days.

III) GROWTH:-
i) All living beings grow. Growth starts from within the body. (Internal Mechanism)

ii) Animal growth is limited upto certain stage of life.

iii) Description of growth phenomenon through example.

iv) Observation of stone, table, through measurement in subsequent days.

IV) MOVEMENT:-

i) All living beings have the capacity to move.

ii) Animal movement may be spontaneous or according to stimuli.

iii) Plant movement is induced by some stimuli.

iv) Non-living being may move by external force.

1) Asking students to observe movement of different animals and plants.

2) Observing the movement of sunflower in the day time.

3) Showing a toy cart and applying force for its movement.

4) Foot ball or rubber ball.

i) Observation of animal (cow, dog, insects) spontaneous movement (according to will).

ii) Movement of sun flower during day time & leaves of touch me not plants on touching.

Sun flower in the garden

Toy Cart

Foot ball or rubber ball.

1	2	3	4
---	---	---	---

(V) FOOD:-

- | | | |
|--|---|--|
| i) Living beings require food for their growth and sustenance. | 1) Asking students to grow two Potato plants and remove leaves from one & retain the leaves of the other. | Two Potatoes grown in different pots. |
| ii) Plants manufacture their own food. | 2) Showing demonstration how the plant manufactures its food through leaves. | Two leaves, collected before sunrise and before sunset. Iodine spirit lamp, Glass beaker, Pot. |
| iii) Animals depend on plants or other animals for their food. | 3) Observation of animals in the surrounding. | |
| iv) Non-living objects do not require food. | 4) Experimenting with coloured liquid on plant. | |

(VI) REPRODUCTION:-

- | | | |
|--|---|--|
| i) All living beings have the tendency to reproduce i.e. to leave behind off springs for continuity of their race. | 1) Showing germinated seeds of different kinds to the students. | Germinated Gram seeds, Maize grafted plants, Potato, Ginger, Banana etc. |
| | 2) Demonstrating Eggs and Chicken in the classroom. | Egg, Chicken |

(VII) EXCRETION:-

- | | | |
|---|---|----------|
| i) Living beings throughout the waste products of the body. | 1) Asking children to list the excretory materials of their own body. | |
| ii) No excretion taken place in non-living | 2) Asking to observe cow dung, Urine etc. | Cow dung |

1	2	3	4
---	---	---	---

(VIII) IRRITABILITY:-

- | | | | |
|--|---|--|---------------------------|
| i) All living beings have the tendency to react to external stimuli. | i) Demonstration of reaction (of children and some lower animals) to hot and cold and external stimuli. | 1) Keeping fire near earth worm demonstrating its reactions to heat. | Earth worm, Some insects. |
| ii) Nonlivings have no reaction to stimuli. | | 2) Asking children to stay for a longer time in sun. | Spinach plant. |
| | | 3) Keeping tender plants in the sun. | |

PART - 2

ANIMALS:- Their Environment and Habitat

- | | | | |
|---|---|--|--|
| I) Animals and plants (biotic) interact with abiotic components (sunlight, Moisture, Soil, diverse structure) | i) Demonstration and observation of the environment (the soil, moisture etc). | 1) Demonstrating children how plants wilt without water | Plants without sunlight for some days. |
| | ii) Description and demonstration through example. | 2) People of western country are fair because of less pigments. | Cactus plant, Charts and diagrams. |
| | | 3) Describing how soil plays a role in distribution of plants. how the climate changes the skin colour of human being. | |
| | | 4) Describing how the hair on the skin of the cow is shed during summer. | |
| | | 5) How skin becomes dry in the winter. | |
| | | 6) Cactus Plants. | |

II) Animals and Plants
adopt themselves
to habitual.

- i) Modification of their i) body. Observation of a Pond (Fishes and other living creature)
- ii) Modification of their body parts.
 - 1) Observation description through diagrams and charts and examples.

- 1) Demonstrating the varieties in shape and size of plants, animals due to their changing needs and environment.
- 2) Asking students collect the pictures of different animals and plant and arranging in different groups depending upon their strudure and appearance.
- 3) Showing charts and pictures of different plants at different regions.
- 4) Asking students to observe and list the structural variation among the animals.

Colour pictures of different plants, animals, birds etc.

III) Inter dependence between plants and animals:-

- i) Animals & plants depend on each other for their food & carbon cycle.

- i) Observation of the school garden.
- ii) Description of CO₂ cycle through examples.

- 1) Demonstrating plant products
 - Rice (Carbohydrate) Pulses (Protein) vegetables (Vitamin, Minerals) fruits.
- 2) Demonstrating the carbon cycle chart.
- 3) Describing why it is not safe to stay under a trees at night.

- 1) Rice, Pulses, fruits.
- 2) A chart of different food and their food values.
- 3) Carbon cycle chart.

1	2	3	4
PART - 3			

I) Modes of Reproduction of Plants:-			
i) Plants are propagated from seeds and other parts of plant body.	<ul style="list-style-type: none"> i) Demonstration of germination process of seeds. ii) Showing of propagation through different plant parts. iii) Diagrams and figures. iv) Observation of Plant growth with and without manures. v) Observation of condition of pest infected crops after use of pesticide.(with or without) 	<ul style="list-style-type: none"> 1) The students will be instructed to collect germinated soil of cereals and pulses & drawing their figures on their note book/B.B.cloth. 2) Taking students to paddy fields and describing the process of cultivation. 3) Demonstrating Patato,Banana, ginger etc. and ask children to list out the different plants and the mode of their propagation. 4) Taking students to different fields. 5) Showing the germinated tamarind and gram seed how it nourishes the young seedling till leaf becomes functional. 6) Asking children to describe how manuring and application of fertilizer done in their field and how it is done and why? 7) Asking students to describe how their parents use different control measures and how they preserve seed, protect the crop. 	<ul style="list-style-type: none"> Rice, Pulses, green, tamarind seeds(dry and germination seeds). B.B.Cloth, coloured charts. Different manures, fertilizers, Plant material. A chart of fertilizers (N.P.K) Patato,Banana, Ginger, Water, Soil.
II) Young seedling desire their food from Cotyledone.			
III) Plants require soil, manure,water and minerals and fertilizers for their growth.			
IV) Protection of seed be done from rhoducts crop pests and fungi, and other animals.			

Suggested Evaluation Tools for each level of objectives

Part - A (Minimum Level of Learning)

1. Fill in the blanks selecting suitable words given in the bracket.
 - a) The body of living organism is build by _____
(Water, air, cells, minerals)
 - b) _____ is living (Train,Tiger,Aeroplane,Bus)
 - c) We perform respiration through _____
(Heart, lungs, stomach, kidney)
 - d) The body of _____ do not grow.
(Chair, fruit, flower,mosquito)
 - e) _____ grows till death (Cow, Stone, Rose plant, Elephant)
2. Select the correct reasons given after each statement:
 - a) Other plants can not grow under the shade of big plants, because:-
 - i) The required food for small plants is absorbed by big plant.
 - ii) Small (other) plants can not get sun light.
 - iii) Small (other) plants can not get required amount of water.
 - iv) None of the above.
 - b) When the forest gets devastated the wild animals get extinct. Because:-
 - i) Wild animals do not get place to stay.
 - ii) Hunters can kill wild animals.
 - iii) Wild animals do not get sufficient food.
 - iv) All the above statements.
3. What kind of reaction you will observe when:-
 - a) Fish is kept out of water.
 - b) Salt is put on the leech.
 - c) A golly worm () is touched by a stick.
 - d) A seedling is planted under the sun.
4. Describe the process (with illustrative diagrams) by which a gram seed gets germinated.

Part- B (General)

1. Fill in the blanks selecting suitable words from the bracket:-
 - a) Our body accepts _____ through inhalation and leaves _____ through exhalation.
(Oxygen, Nitrogen, Carbon dioxide, Carbon monoxide)
 - b) _____ takes active part in respiration in case of plants (Stem, Root, Leaf, Fruit)
2.
 - a) Write five names of living organism which can move on their own.
 - b) Write four names of plants which can respond to stimuli distinctively.
 - c) Write ten names of animals who reproduce through eggs.
 - d) Write the name of the plant which has vegetative reproduction through leaf.
 - e) Write five names of plants which reproduce vegetatively through stem.
3. Make a list of use of Cow excreta (Urine and dung)
4. Match the words given in Col.A and Col.B.

<u>Col.A</u>	<u>Col. B</u>
a) Camel	a) Water
b) Pine	b) Land and water
c) Crocodile	c) Desert
d) Earth-worm	d) The foot regions of Himalayan ranges.
e) Fish	e) Plain land
	f) Inside the earth (soil)
	g) Sea-beech

5. Identify the wrong statements by putting a cross (X)
 - a) Animals prepare the food on their own.
 - b) Plants accepts liquid food.
 - c) Sunlight does not help in preparation of food in plants.
 - d) Plants accept carbondioxide during respiration.
 - e) Carbondioxide would have been increased a lot if plants would not have been there.

6. Give the answer in one sentence or two.
- a) How can you ^{regenerate a} plant from sugar cane ^{stem}.
 - b) How can you create a new drum-stick plant.
 - c) How can you help in regeneration of pine apple plant.
 - d) What do you observe when the two cotyledons of a tamarind seedling are cut.
7. How can you preserve corn seeds ?
8. Take the Chilli seedlings and five earthen pots. Fill up the pots as follows:
- a) First pot - Sand
 - b) Second pot - Water
 - c) Third pot - Soil with manure
 - d) Fourth pot - Manure
 - e) Fifth pot - Soil, sand, manure and water in required amounts.

Keep all the pots in such a place so that they will get sunlight. Take proper care of the pots and seedling after keeping one seedling in each pot. Observe the seedlings for seven days. What kind of change you could observe with all the seedlings. Measure their height and keep note of all changes you could observe in your note book.

--:10:--

LESSON PLAN

CLASS - V

UNIT:- LIVING WORLD

TOPIC:-Body strudure of animals
and their environment.

Instructional Objectives

- 1) To acquire knowledge about different types of animals and their environment.
- 2) _____ Knowledge and comprehension about the modification of body structure and its help to animals for adapting in the environment.
- 3) _____ the skill of rearing animals in conducive environment.
- 4) To apply the knowledge in their daily life situation.
- 5) To develop attitude for protection of animals and their environment.

Teaching Aids

- 1) Coloured pictures of duck and cock
- 2) Living typical fish.
- 3) Living typical cat fish.
- 4) Glass bowl
- 5) Model of different types of fishes.
- 6) Coloured picture of camel, deer and sheet.
- 7) Water.

Methodology - Demonstration, observation and discussion.

Teaching Points:- External feature of fish body, Respiration in fish, Function of fins and tail, Mechanism involved in floating of fish in water, External feature of duck, function of feather and hind limb, External feature of camel, Environment of camel, Function of its feet and hump, Environment of animals having fur, hoof, horn etc.

(A) Introduction

Previous knowledge

- Introductory questions:-
- Showing a picture of a cock and a duck -
1. What are those ?
 2. How many fingers do you see in cock's leg ?
 3. What is the speciality of duck's foot ?
 4. Where do the cocks and ducks move about ?
 5. Which part of the body of a duck helps it to swim in water ?
1. Give names of five different types of fishes ?
 2. What types of fishes are seen at the upper surface of water.

(B) Presentation

External feature of fish.

- In a big glass bowl of water bigger fish is shown to the students.
3. When the ponds get dried during summer what happens to the fishes.
 4. Why does the fishes survive in comparatively less in hot water.
 5. How does the head portion of fish look like ?
 6. What benefit it must be enjoying because of the shape of the head ?

Types of fishes Small Big

Upper level of water - small fishes.

Lower level of water - big fishes.



Absorbed oxygen in water gets released due to heat. Can pierce easily inside water.

Function of Fins & Tail

7. Indicating at the fins of the fish -

What change do you observe in the movement of fish because of the action caused by the fins.

8. Indicating at the tail -

How does the tail help the fish to move ?

Some students may have travelled by boat in river. Ask them about their feeling when moving by the boat. How the boat proceeds forward, change its direction etc.

The boat man controls the boat from rear not from the front like bus, truck etc. Fish control direction through its tail.

One student will be asked to shut his nose and mouth for sometime. Then he will be asked about his feelings.

9. How do you feel when mouth and nose are shut ?

10. Why do you feel so ?

Want of Oxygen.

Keeping the fish out of water -

11. How does it behave ?

12. Why does it behave so ?

13. How does fish gets oxygen in water ?

14. How does fish take oxygen into its body ?

Fish gets oxygen dissolved in water. Fish takes oxygen through its gills.

Showing an air sac from the body of a fish.

Function of air sac present inside the body of fish.

15. What is inside the sac ?

Air

16. How does it help to fish ?

Help in floating.
Help in going deep into water.

17. If there will be less air inside the sac, what will happen to fish ?

Air sac help in floating, sinking and respiration.

1

2

Showing the scales in the body of a fish -

18. How do the scales help the fish ?
Ask the students to show fore limb and hind limb.
19. How do the fore limbs help a duck ?
20. What are present in fore limb ?
21. How do the feathers help duck ?
22. Why doesn't water stick to the feathers ?
23. What is the placement of hind limbs in the body of a duck ?
24. What is the speciality of fingers of the hind limb ?
25. In which way the webs are helpful to duck ?

External feature of duck.

3

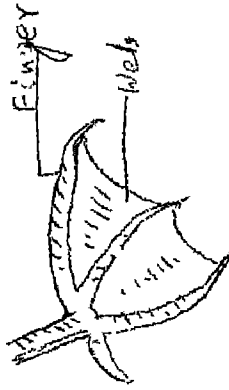
Some fishes produce sound because of air sac.
Scales save the body from outside injury and prevent absorption of water into the body.

Feather

Oily feather

In the middle of the body.

- Presence of web.
Webs act like an oar, it helps in moving forward while swimming in water.
Tail region.
26. During change of direction while swimming which part of the body of duck help ?



- Presence of web in duck leg
27. Give five more names of animals who live in water? Tad-pole, water insects, Leech, Crab, Prawn.

1

External feature of Camel
and its environment.

Showing picture of a Camel.

28. Where do we find more Camels in our country ?

Rajasthan - Thar desert

Showing at the feet of the Camel.

29. What speciality do you find there ?

A fleshy pad

Showing the picture of hoof of a bull.

30. How do you differentiate the feet of a Camel
and of a bull ?

Camel

31. Who can walk easily on sand ?

32. Why ?

Showing at the hump of the Camel.
The hump of a camel help it to live without water
for a longer duration. Camel store some amount of
water and food in the hump. The hump is fatty.

Animals having hoof, fur and
horn and their environment.

33. Which is harder between feet of a Cat and
hooves of a goat ?

34. Which way do it help them ?

Bear, sheep, rabbit.

35. Give three names of furry animals

36. How does fur help the animals ?

37. Where do we get more furry animals in our country ?

38. How do the horns help the animals ?

1

2

3

(c) Comprehension

1. Why doesn't fish live without water ?
2. Why don't the wings of duck get wet even though it swims in water ?
3. How does a Camel remain without taking any food in the desert ?
4. Why do the animals have long fur in Himalayan Region.
5. If the hocks of oxen would have been soft what problem would have been faced by them ?

(D) Summary

1) How do the fishes respire ?

2) How does the construction of the body of a duck help in swimming in water ?

3) What is the speciality of camels' feet ?

4) Where do we find more furry animals in our country?

5) Which animals protect themselves by the help of horns ?

Summary

Fishes respire through their gills. They absorb oxygen dissolved in water. The fingers of duck get connected by the help of web. Its legs act as oar and help in swimming because of oily feathers of duck. Water does not stick on its body. The feet of Camel is round fleshy and flat. It helps it to walk on sand. The furry animals are seen in cold region like Himalayan ranges. Cows, buffaloes, deer, goats, sheep protect themselves by their horns.

(E) Application

1. Fill in the blanks selecting appropriate words given in the bracket.
- a) Fish changes its direction by its _____ in water.
(fins, gills, tail, air sac)
- b) _____ of Cat helps in hunting without producing any sound. (feet, claws, eyes, ears)
- c) During _____ more of fishes die in pond water.
(Rain, Summer, Winter, Spring)
2. Select the correct answer given at the end of the statement.
- . The hard hooves help deer -
- i) in attacking its enemy by the help of hooves.
- ii) to move in the hilly area.
- iii) giving signals by thumping sound.

3. Match the following given in Col. 'A' and Col. 'B'.

<u>Col. 'A'</u>	<u>Col. 'B'</u>
Whale	Himalayan Region
Crocodile	Sea water
Camel	Land and water
Yak	Forest of Assam
Duck	Thar desert
	Pond water

(F) Home Assignment

1. Identify any five animals from your environment. Prepare a report on their body structure and procedure of protecting their environment.
2. State two measures by which we can protect our environment so as to make our life comfortable.
3. Prepare an aquarium and a herbarium in your school.

Module-7 Group - 7

UNIT: - Human Body, Food & Health.

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LESSON - 7 HUMAN BODY, FOOD AND HEALTH
MAJOR CONCEPT - HUMAN BODY

Minor Concept	Suggested teaching strategies	Suggested activities	Suggested teaching aids
1 Skeleton	2 Demonstration, Observation, Guided study	3 Presentation of complete human Skeleton in the form of models, charts, drawing and collection of bones.	4 1) Human Skeleton 2) Chart showing Human skeleton 3) Some collected bones from the vicinity.
A. Axial			
i) Skull-22 Nos	-do-	Presentation of Skull, showing the tight joints of the skull which can not be easily loosened consists of 22 bones. Starting of backbone from the bone Atlas (1st vertebra), till the caudal vertebra consist of 33 bones.	Skull Chart of skull
ii) Backbone-33 bones (Vertebral column)	-do-	Ribs sternum and thoracic vertebra forms the thoracic cavity. There are altogether 24 ribs which form the wall of thoracic cavity. Altogether 4 ribs are there which are connected to thoracic vertebra at dorsal side but the rest ribs are connected to thoracic vertebra dorsally and to the sternum at the frontal side.	Complete back bone. Chart of back bone showing the placement of each vertebra. Thoracic vertebra sternum and ribs from the skeleton, chart showing the thoracic cavity.
iii) Ribs and sternum (24 + 1) bones	-do-		

1	2	3	4
---	---	---	---

B) Appendicular

i) Fore limbs
30 bones in each
limbs pectoral
girdles with
color bones(2+2)
bones.

Demonstration,
Observation,
Guided study

The bones (30 bones each) of forelimbs are connected to the body by the help of pectoral girdles on each side of the body. The girdles are stretched by the help of 2 color bones on each side of the body which keep stretch the chest.

Forelimbs and pectoral girdles chart showing the bones of forelimbs and pectoral girdles.

ii) Hindlimbs
30 bones each
in each limbs
Pelvic girdles
2 bones.

Demonstration
Observation
Guided study

Hind limbs and Pelvic girdle. Chart showing the bones of hind limbs and pelvic girdles.

iii) Joints

The joints act like ninge for the smooth movement of the body. Types of joints.

Chart showing fixed and movable joints.

Placement of important and soft organs of the body.

- i) Brain -do-
- ii) Spinal cord -do-
- iii) Heart and lungs -do-

Present inside the cranizem(skull)
Present inside the back bone (Vertebral column)
Present inside the thoracic cavity

Nervous system

- a) Sensory nerves
- b) Motor nerves

Brain,spinal cord and nerves together forms the nervous system.

Chart showing nervous system.

- a) Receives stimuli through same organs by sensory nerves.
- b) Brain response through motor nerves.

1	2	3	4
---	---	---	---

Skin

Demonstration,
Observation,
Guided study

Protects the body from the attack of outside danger. Gives a smooth and beautiful covering to the body.

Muscle

Discussion
Demonstration

Muscles are around the bones and in other parts of our body. The contraction and expansion of muscles helps the body to do the work.

Chart showing
types of muscles.

a) voluntary

- do -

- a) Some muscle contract and expand on their own without our knowledge (voluntary muscle) Cardiac muscle (muscle of heart), Pulmonary muscle (muscle of lungs), muscle of elementary canals etc. work on their own .

b) Involuntary

-do-

- b) Some muscle contract and expand as per our wish. Muscles of our hands and legs etc. are involuntary muscle.

Exercises

Demonstration,
Observation.

To keep the muscles fit for work. We require regular exercises. The exercises helps the muscle fit to do the work. It keeps our body healthy.

Pose and posture of the body in different types of exercises.

1	2	3	4
Personal hygiene	Observation Narration Guided study	Personal cleanliness, cleaning of hands before taking food, bathing, massaging oil before bathing, cleaning dress and other clothes by different methods. (By soap and detergents, putting under the sun, boiling with washing soda etc.), cutting nails in proper time to prevent deposition of dust and other nasty materials under the nails.	Charts and posters showing personal hygiene.
Beneficial microbes	Observation Narration Guided study	Preparation of curd from milk, presence of Nitrogenous bacteria in the nodules of the roots leguminous plants. Decomposition of dead bodies by certain bacteria, preparation of manures from the materials by microbes.	
Harmful microbes	-do-	Certain microbes causes diseases with us, plants and animals. They create different types of diseases. Each microbe is responsible for specific disease. Air borne diseases - Smallpox, Chicken pox, Measles, Influenza, Cough, Pneumonia etc. Water borne diseases - Cholera, Dysentery, Typhoid. Diseases caused through contact - Scabies, eczema, leprosy. Diseases caused by insects - Cholera, Malaria, Filaria	Chart showing different types of diseases.

1	2	3	4
Immunity and Vaccine		<p>Our body has got a specific power to prevent diseases and keep us healthy. This power is known as 'immunity'. To increase the immunity in our body artificially injection and vaccines are taken before occurrence of the disease in our body.</p> <p>i) BCG Vaccine for Tuberculosis</p> <p>ii) Cholera and Ptyphoid injection for cholera and ptyphoid.</p> <p>iii) Vaccine for Smallpox, Measles, Polio etc.</p>	
Disinfectants	Demonstration of samples, Narration, Self study	<p>Lime, Phenyl, Detol, Bleaching powder, gamaxine, fresh cowdung, Phenol (Carbolic acid).</p> <p>Natural disinfectants - Fire, Sunlight</p> <p>Disinfectants helps in killing the germs.</p> <p>"Prevention is better than cure"</p> <p>For prevention of diseases cleaning the utensils and other materials which are in regular use must be taken care of.</p>	Different disinfectants.
First-aid	Demonstration, Bleeding after injury must be checked by Observation, different methods by the help of clean clothes, Narration, cotton, tying on either side of the injury Guided study for some time.		First-aid box.
Snake bite	-do-	After checking the bleeding patient is to be hospitalised.	Chart showing different accidents and its prevention.
Insect bite	-do-	Application of Ammonia water, lime water, detol etc.	

SUGGESTED EVALUATION TOOLS FOR EACH LEVEL OF ACTIVITIES

Part - 'A' (Minimum Level of Learning)

Human Skeleton

1. Fill in the blanks selecting suitable words from the bracket.
 - a) _____ give shape to our body.
(Veins, Nerves, Bones, Muscles)
 - b) There are _____ pieces of bones in human body.
(106, 200, 260, 206)
 - c) _____ is well protected inside the skull
(Cranium)
(Heart, Brain, Lungs, Spinal cord)
 - d) Spinal cord is being protected by _____
(Back bone, Ribs and Sternum, Skull,
thoracic vertebra)
 - e) Movement of body is possible because of _____
(Bones, Joints, Arteries, Nerves)
 - f) The give and take of message to brain
is done by _____.
(Blood, Muscles, Arteries and Vein, Nerves)
 - g) The Cardiac muscle is _____.
(Voluntary, involuntary, Controlled by brain,
Controlled by spinal cord)
2. Give the answer in one or two sentences:-
 - a) What are the components of Nerve system ?
 - b) Which nerves bring order/^{message} from brain to the muscles ?
 - c) What are the different types of nerves in our body?
 - d) Which type of nerve informs to the brain about mosquito bite in our body ?
 - e) What is essential to keep muscles healthy ?
3. Indicate the fixed joint from the following given below:-

Joints in Skull

Elbow,

Knee,

Back bone (Vertebral column)

4. Match the words selecting appropriate words from Col. 'A' and Col. 'B'.

<u>Column 'A'</u>	<u>Column 'B'</u>
a) Skull	a) Involuntary muscles
b) Back bone (Vertebral column)	b) Joint
c) Lungs	c) 206
d) Nerves	d) Brain
e) Knee	e) Spinal Cord
f) Human Skeleton	f) Mosquito bite
	g) Voluntary muscles

F O O D

1. Fill in the blanks selecting appropriate words given in the bracket.

- a) _____ helps in growth of our body.
(Carbohydrates, Proteins, Fats, Vitamins)
- b) Body receives energy from _____ and _____
type of food.
(Vitamins, Water, Mineral, salt, Fats, Carbohydrates)
- c) Honey is _____ type of food.
(Mineral salt, Carbohydrates, Vitamins, Fats)
- d) _____ is essential for proper development
of the body.
(Balanced diet, Water, Pulses, Cereal)
- e) Milk turns into curd by the help of _____.
(Bacteria, Lemon juice, Tamarind)
- f) Food is being preserved in _____ for long.
(Almirah, Refrigerator, Earthen pots,
metallic pots)

2. Express in one word:-

- a) The container where food is being preserved
for a long duration.
- b) The organisms which help in spoiling fruits
and vegetables.
- c) One which supplies energy to our body.
- d) The food which helps in protecting body
from the diseases.

3. Match the following selecting suitable words from each column.

<u>Column 'A'</u>	<u>Column 'B'</u>
1. Protein	a) Microbes
2. Carbohydrates	b) Honey
3. Fats	c) Food preservation
4. Vitamins	d) Sugar
5. Spoiling of food	e) Coconut
6. Refrigerator	f) Egg
7. Balanced diet	g) Lemon
	h) Milk

HEALTH

1. Categorise the following diseases under each type (viz. Water borne, air borne, through contact)
- Cholera
Dysentery
Pneumonia
Eczema
Tuberculosis
Chicken pox
Leprosy

2. Match the following selecting appropriate words from each column.

<u>Column 'A'</u>	<u>Column 'B'</u>
1. Epidemics	a) Air borne
2. Tuberculosis	b) Disinfection
3. Typhoid	c) Disinfectant
4. Leprosy	d) Bacteria
5. Dettol	e) Water borne
	f) Through contact

3. Fill in the blanks selecting suitable words given in the bracket.

- a) Microbes causing diseases are known as _____.
(Germs, Insects, Atoms)
- b) _____ spreads because of air.
(Cholera, Dysentery, Smallpox)
- c) Scabies spreads _____.
(through air, through water, through contact)
- d) _____ is natural disinfectant.
(Phenyl, Sunlight, Bleaching powder)

Part - 'B' (General)

Human Skeleton

1) Answer in two or three sentences.

- a) What benefit do we derive because of flatness of our feet ?
- b) Where do we find joints like elbow in our body ?
- c) Which joint of our body is like the hinges of windows ?
- d) How could we bent forward ?
- e) Heart works like which machine ?
- f) What benefit do we get because of placement of thumb ?
- g) Which animal possesses thumb like us ?
- h) Why do the scooter rider use helmet ?

2) Select the correct answer given under each statement.

- a) The hanks used by artist for constructing idol is compared with.
 - i) Muscles of the body.
 - ii) the skeleton of our body
 - iii) the skin of our body.
 - iv) none of the above.
- b) Spinal cord controls
 - i) blood circulation in our body
 - ii) respiration in our body
 - iii) few nerves in our body
 - iv) none of the above.

- c) The joints of back bones are
 - i) movable completely
 - ii) fixed
 - iii) partially movable
 - iv) None of the above
- d) The joints of teeth with jaws are
 - i) like joints in the shoulders
 - ii) like joints in the skull
 - iii) like joints in the knee
 - iv) none of the above
- e) Heart is protected by
 - i) Skin
 - ii) Ribs and sternum
 - iii) Skull
 - iv) None of the above.
- f) While throwing a rubber ball
 - i) the muscles of the hands work voluntarily
 - ii) the muscles of the hands work involuntarily
 - iii) the bones work on their own
 - iv) none of the above.
- g) When a nail get into our feet while walking
 - i) the information goes to our brain through sensory nerves.
 - ii) the information goes to our Spinal cord through motor nerves
 - iii) the information goes to our Spinal cord through sensory nerves.
 - iv) the information goes to our brain through motor nerves.

F O O D

1. Give the reasons in brief:
 - a) Glucose is being supplied to the players in the play ground.
 - b) We suffer from diseases due to want of fresh vegetables.
 - c) Nitrogenous bacteria are found in the nodules of the pulse yielding plants.
 - d) The microbes requires optimum heat and humidity.

2. Give Cross (X) mark by the side of the correct answer:

- a) For better growth in our body
- i) Vitamins are essential
 - ii) Proteins and mineal salts are essential
 - iii) Carbohydrates are essential
 - iv) Fats are essential.
- b) Honey is a
- i) carbohydrate type of food
 - ii) kind of food and has got medicinal value
 - iii) product of cottage industry
 - iv) all the above are correct.
- c) Preparation of pickle is based on the idea of
- i) Balanced diet
 - ii) Vitamins
 - iii) Refrigeration
 - iv) Food preservation
- d) Nail biting is discouraged because
- i) Nails will be spoiled
 - ii) There will be bleeding
 - iii) Microbes will enter into the body
 - iv) There will be vomitting

HEALTH

1. Fill in the blanks selecting suitable words given in the bracket.

- a) ~~Patient~~ ^{Snake bite} should be taken into _____ for treatment
(Temple, Sorcerer(Tantrik), Hospital)
- b) To prevent smallpox _____ is considered as a preventive measure.
(Vaccine, goddess worship, act of Sorcerer)
- c) Patient suffering from dysentery should be given _____.
(Bread, Malted rice, Oral Rehydration Solution)
- d) bleeding is being checked by application of _____ to the injury.
(Petals of the flowers, juice of 'Vishalya Karani' leaf, cotton)

- e) The fire caught by wearing ^{cloth} ~~the~~ should be extinguished by _____.
(Pouring water, Throwing dust, Covering blanket)
- f) Magician achieves success because of _____.
(Magic wand, hypnotism, sleight of hands)
- g) _____ leaf is burnt to drive out the mosquitoes from house.
(Neem, Mango, Tulsi)

2. Give the answer in one sentence

- a) What is first-aid ?
- b) Give two media through which cholera spreads
- c) Name two air borne disease
- d) Why does saline water and glucose solution given to a Cholera patient ?
- e) Name two diseases by mosquito bite.
- f) Name the carriers of hydrophobia and plague
- g) What is the first-aid to the patient; suffered from sun stroke ?

MODEL LESSON PLAN

UNIT:- HUMAN BODY - FOOD AND HEALTH

TOPIC:- HUMAN SKELETON

Instructional objectives:- Aft. teaching the topic the students will be able

- 1) To know about the skull, spinal cord, ribs and other bones of human body.
- 2) To understand the process by which the bones protect the important organ of human body.
- 3) To apply the knowledge in their real life situation.
- 4) To realise the importance of these parts and the need of taking certain measures to protect them.
- 5) To be free from superstition with regard to the use of bones etc.

Teaching Points:- The skull, the backbone, the thoracic cavity.

Methodology:- Demonstration, observation and discussion.

Teaching aids

1. Complete human skeleton
2. Chart showing different parts of skeleton.

Matter	Teacher's Activities	Blackboard work
1	2	3
A) Introduction		
Previous Knowledge	<u>Introductory question</u> 1) What materials are being used while making the idol of Saraswati and Ganesh in your school ? 2) Why do you use bamboo, straw, husk etc. 3) After preparing the model what is applied to prepare the idol ? 4) Of what the human frame built up ? 5) What do you call this frame ?	Human skeleton
B) Presentation	 Showing the skeleton 1) What is this ? 2) How is it made up of ? There are 206 bones in the skeleton showing at the skull. 3) What is it ? 4) Where do you find it ? 5) What is there inside it ? Students will be allowed to touch the skull by their hand so as to enable them to develop proper feeling towards it. Indicating at the placement of eyes in the skull 6. What was there at the place ?	206 bones are there in human skeleton. Skull Brain is inside the skull. Eye was there inside the socket.

1

2

3

7. What do you find at this place ?

Nose

Indicating at the two sides of the skull

8. What^{do}/we find at these places
Exposing the students at the backbone(vertebral column)

Ears are placed at those places.

9. What is it ?

It is back bone
(vertebral column)
Spinal cord is placed inside it.

10. What do you find inside it

Ask the students to touch the backbone of other student and they will be given scope to feel the placement of backbone in our body.

Asking a student to bend down forward

11. How can we bend forward or back ward ?

It is possible because of joints at the backbone

A student will be asked to count the numbers of bones present in the backbone.

12. How many bones could you count ?

There are 33 bones.

Indicating at the thoracic area of the skeleton.

13. What are these ?

These are ribs.

14. How many ribs we can see ?

24 ribs

--:19:--

1

2

3

Showing at the chart of skeleton

15. What do you find inside the thoracic cavity
16. How are the ribs connected ?

Lungs and heart.

Ribs are attached to
sternum; ~~at~~ the front
and to the back bones
(vertebral column) ^{at} the dorsal side.

Showing at the chart

17. How is the heart placed ?

Heart is placed in
between the lungs.

The lower part of the skeleton is pelvis area.
Showing at the appendages.

18. What are those ?

Appendage bones.

C) Comprehension

- In the absence of bones in our body
1. What problem would we have to face ?
 2. How is the eye protected in the skull?
 3. How do the ribs help us ?
 4. Why do we feel much pain when heated at the back of your head ?
 5. What is the role of helmet for a scooter rider ?

D) Summary

1. How many bones do we find in the human skeleton ?

Summary

There are 206 bones in
human skeleton.

1

2

3

2. What are the different parts of the skeleton ?

The parts are skull, back bone, Thoracic area, Pelvic area and appendages.

3. What do we find in the skull ?

We find brain inside the skull and at the front side mouth, nose, eyes and at the side of the skull, ears.

4. What do we find inside the vertebral column?

There is spinal cord inside the backbone.

5. What do we see inside the thoracic cavity ?

Heart and lungs are present inside the thoracic cavity.

E) Application

1. Fill in the blanks selecting suitable words given in the bracket.

a) Human skeleton has _____ pieces of bones.
(106, 200, 206)

b) _____ is well protected inside the vertebral column.
(Spinal cord, brain, heart)

c) Lungs are well protected by the presence of _____.
(Skull, back bone, ribs)

2. If a cricketeer does not put any protection in front of his chest what problem would occur ?

3. How does the skull rest on the body ?

--:21:--

1

2

3

4. Find out the correct answer of the given statement.

We get afraid of looking at the bones and skulls presented by a magician.

- a) Ghosts reside inside the bones and skull.
- b) Goddess is present inside the bones and skull.
- c) We have never touched it and because of superstition_{us} belief.

F) Home assignment

- 1. What precautions would you take to protect brain, lungs, and heart of your body while playing cricket.
- 2. Draw a neat labeled diagram of skull and backbone.
- 3. Why does one get sunstroke easily when he is heated at the dorsal side of his head?

--: (c) :--

